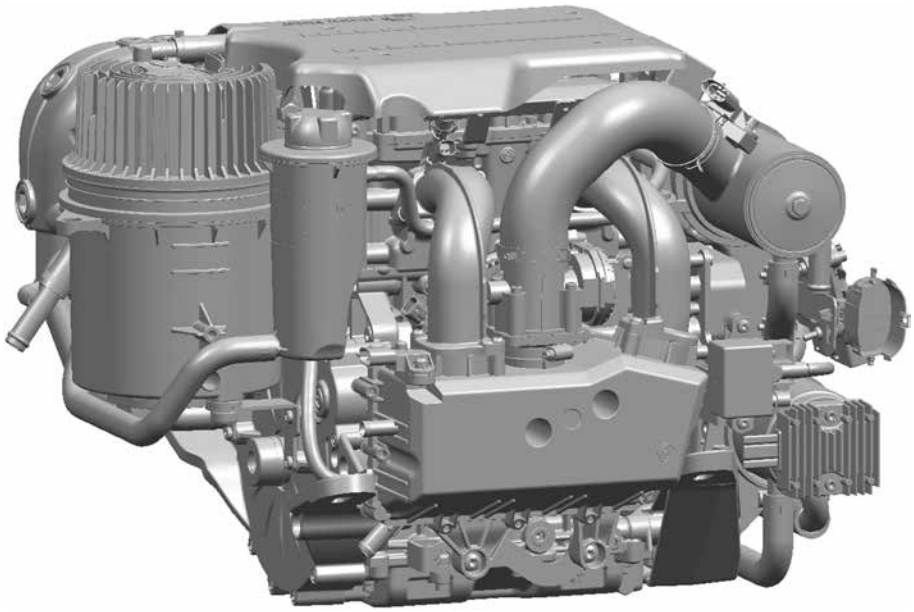
Weber Motor



SERVICE MANUAL

4-Stroke Engine
MPE 850 MARINE

This service manual is valid for the following engine variants:

- 408101 I2 846 MAR TC-100 (TC-80) (TC-120)
- 408014 I2 846 MAR TC-120
- 408090 I2 846 MAR TC-155

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en_English

Read this service manual thoroughly before operating the engine for the first time.

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1 About this document

This service manual was designed to help you operate the engine safely and reliably.

Observe the following information:

– Read this service manual thoroughly before operating the engine for the first time.
– The service manual is for the engine in your vehicle.
– Keep the service manual in a safe place.
– Make sure that all personnel using the vehicle have access to the service manual.
– If you sell the vehicle, always pass on the service manual to the new owner.
– The latest version of the service manual is available for download in other languages from our web site www.weber-motor.com.
– Always read the vehicle manufacturer‘s documentation.
– Some figures in this service manual are general illustrations and may differ from the actual engine.

1.1 Meaning of symbols and signal words

Item	Meaning
NOTICE	The signal word *NOTICE* indicates potential property damage.
Information	The signal word **Information** indicates specific features and recommendations.

2 Safety

This engine is state-of-the-art and built according to recognized safety-technical regulations. Ignoring the information in this service manual may result in personal injury or property damage.

Read and observe the following safety messages carefully before operating the engine for the first time.

Observe all generally applicable laws and regulations in addition to the information in this service manual:

– Accident prevention
– Environmental protection
– Handling of hazardous materials
– Personal safety equipment
– Traffic laws

2.1 Meaning of safety alert symbol and signal words

Item	Meaning
	The safety alert symbol draws your attention to possible dangers.
WARNING	The signal word **WARNING** indicates a potentially dangerous situation that may lead to a serious or fatal injury.
CAUTION	The signal word **CAUTION** indicates a potentially dangerous situation that may lead to a minor or moderately severe injury.

2.2 Important safety messages

Service tasks

In order to keep your engine in a safe operating condition, regular servicing is essential. It is your responsibility to ensure that the engine is serviced correctly.

► Perform regular inspections and observe the specified service intervals.

Service tasks in the workshop

All service tasks described in Chapter 8 **Service tasks in the workshop** require special technical knowledge of the engine.

► All service tasks described in chapter 8 **Service tasks in the workshop** must be performed by a workshop authorized by Weber Motor or the vehicle manufacturer.

Malfunctions

Engine malfunctions pose a safety risk to personnel.

► Only operate the engine when in perfect condition.

► All malfunctions must be repaired immediately in a workshop authorized by Weber Motor or the vehicle manufacturer.

Spare parts

All the components in your engine have been carefully tested and fulfill strict quality and safety requirements. Externally supplied parts cannot fulfill these requirements.

► Always use original Weber Motor spare parts.

Add-on parts and modifications

The consequences of attaching add-on parts and making unauthorized modifications to the engine are unknown and pose a safety risk to personnel.

► Modifications and the attachment of add-on parts is only permitted if approved or instigated by Weber Motor.

Hot engine components

Engine components become extremely hot during operation.

► Do not touch any engine components during operation.

► Switch off the engine and wait until the components have cooled.

Engine power supply

Some service tasks require disconnection of the engine from the power supply. Starting the engine inadvertently may endanger the safety of personnel.

Read the vehicle manufacturer‘s documentation for more information.

► Disconnect the engine from the power supply when requested.

Engine exhaust gases

Engine exhaust gases contain carbon monoxide (CO). Inhalation of carbon monoxide can deprive the body of oxygen and result in organ damage or even death by asphyxiation.

► When operating the engine in enclosed spaces, use exhaust hoses to direct the engine exhaust gases into the open.

Handling of fuel, engine oil and coolant

Operating materials pose a health risk.

► Always read the manufacturer's instructions.

► Always wash your hands prior to eating, smoking and using the toilet as well as at the end of the working shift when working with operating materials.

Operating materials are hazardous to the environment.

► Never allow operating materials to escape into the groundwater, water courses or sewage system. Always dispose of operating materials according to applicable national regulations.

Danger of slipping on spilled fluids.

► Always use a filler neck or funnel when filling components with operating materials.

► Always clean up any spilled operating materials immediately.

Fuel

Fuel is highly flammable. Vapors may ignite and cause an explosion.

► Do not smoke in the vicinity of the engine and do not allow naked flames or sparks near the engine or the fuel system.

► Never fill with fuel while the engine is running.

► Do not start the engine if there is a smell of fuel or you suspect that fuel is leaking. Have a workshop authorized by Weber Motor or the vehicle manufacturer inspect the engine immediately.

► Fuel on hot surfaces can cause fires.

► Do not extinguish with water. In the event of a fire, use foam, dry chemical or carbon dioxide extinguishers.

California Proposition 65	Warning against chemicals/hazardous materials according to the law of the state of California. This product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

3 Description

3.1 Intended use

The MPE 850 MARINE has been designed for powering watercrafts.

The engine was not designed or intended for any other use.

3.2 Identification

Each engine is assigned two identification numbers. Both numbers are printed on a label 1 affixed to the engine.

The part number “Part No.:” 2 is the number of the engine variant.

The serial number “Serial No.:” 3 is an unique number for each individual engine.

Take the time to enter the part number and serial number in chapter 9 **Confirmation of service tasks**. Both numbers are required when making queries about your engine.

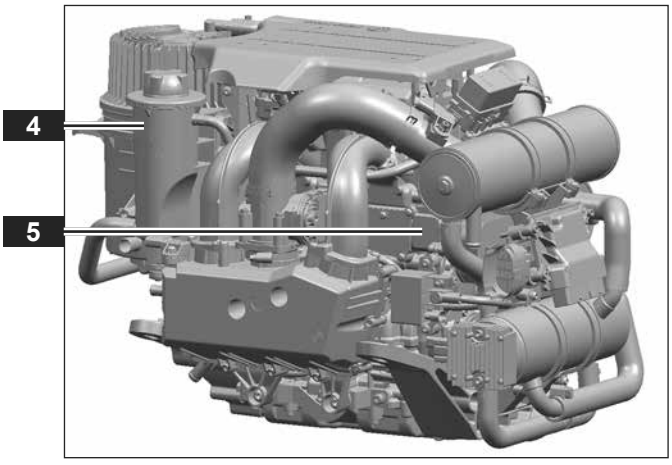
Engine variants
I2 846 MAR TC-80, TC-100 and TC-120

The label with the part number and the serial number is located on the expansion tank 4.

The serial number is also engraved on the crankcase 5.

The label “Emission Control Information” indicates the certification of the engine according to the legal exhaust emission guidelines. (See in appendix exhaust type authorization and certification.)

The label is located on the expansion tank.



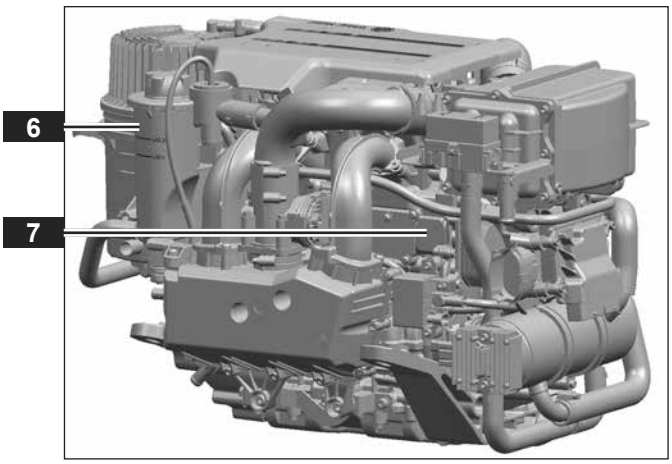
Engine variant I2 846 MAR TC-155

The label with the part number and the serial number is located on the expansion tank 6.

The serial number is also engraved on the crankcase 7.

The label “Emission Control Information” indicates the certification of the engine according to the legal exhaust emission guidelines. (See in appendix exhaust type authorization and certification.)

The label is located on the expansion tank.



3.3 Fuel

Recommended fuel quality	Engine variants I2 846 MAR TC-80, TC-100 and TC-120:
	Unleaded gasoline (super) with an octane rating of 95 ROZ or 85 MOZ.
	USA: "Premium 91", unleaded
	Engine variant I2 846 MAR TC-155:
	Unleaded gasoline (super) with an octane rating of 98 ROZ or 88 MOZ.
	USA: „Premium 93“, unleaded
Minimum requirement	*NOTICE!* Low octane fuel can cause loss of power and/or increased fuel consumption.
	Unleaded gasoline with an octane rating of at least 91 ROZ or 82,5 MOZ.
	USA: At least "Regular 87", unleaded
	NOTICE! An increased share of ethanol can lead to premature abrasion and poor starting performance of the engine.
Permissible share of ethanol	Maximum 15 % (E15)

3.4 Engine oil

NOTICE

Engine damage due to incorrect engine oil grade or viscosity.

An incorrect engine oil grade or viscosity causes excessive wear and moving parts may start to seize up.

- ► Always use the recommended engine oil.
- ► Do not mix engine oils of different grades or degrees of viscosity.

Engine oil	0W 40 completely synthetic, at least API SJ, ACEA A3/B3
Fill quantity	Initial filling 3,5 liters [3.7 qt (US)]
	After changing oil 2,9 liters [3.1 qt (US)]

Information! Weber Motor recommends you always to keep a supply of engine oil to hand. Consult your local vehicle dealer.

3.5 Coolant

NOTICE	**Freezing, overheating or corrosion due to incorrect mixing ratio or unauthorized coolant additives.** An incorrect mixing ratio reduces the cooling capacity. Combining different coolant additives may trigger a chemical reaction and they may lose their effectiveness. ► Use the same coolant throughout the year in the mixing ratio specified. ► When topping up the coolant, do not change the mixing ratio. ► Always use approved coolant additives when topping up the coolant.

Coolant additive	Coolant additive based on ethylene glycol, silicate- and nitrite- free, suitable for aluminium engines.
Mixing ratio	50 % water + 50 % coolant additive
Fill quantity	2,75 liters [2.9 qt (US)]
Approved coolant additives	BASF Glysantin G 30
	Chevron Havoline Extended Life Coolant XLC+B
	Valvoline Zerex G 30

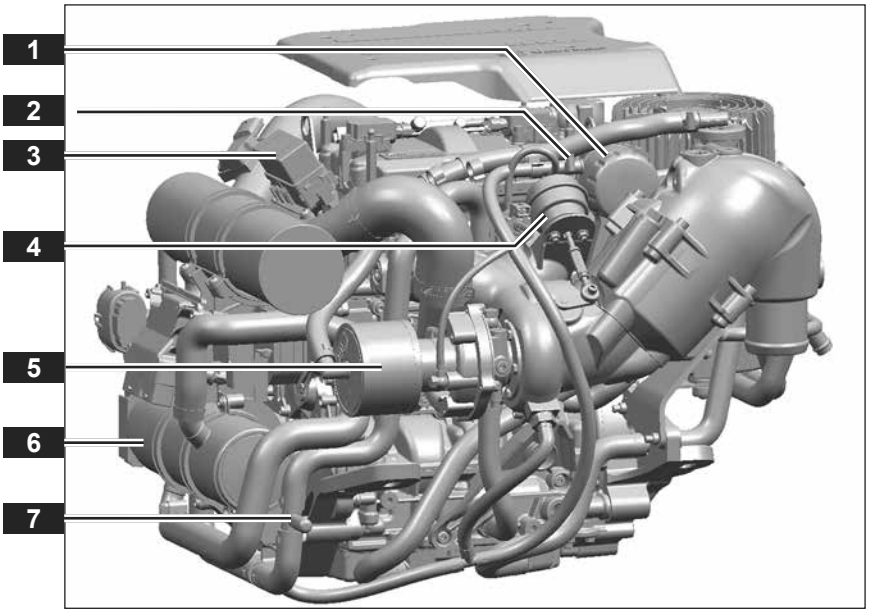
Information! Weber Motor recommends you always to keep an adequate supply of ready mixed coolant to hand. Consult your local vehicle dealer.

3.6 Engine components and information

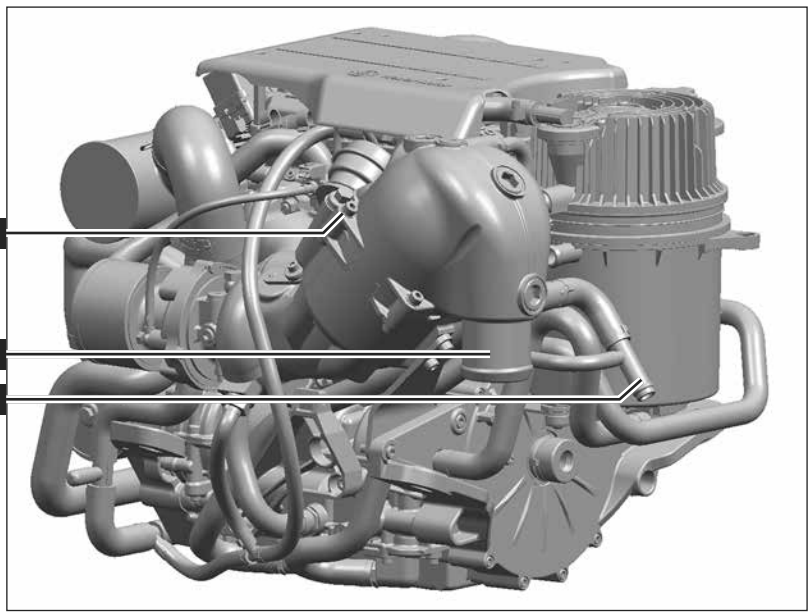
Information! If you remove the vehicle connector "Engine-Chassis" the engine will not be disconnected from the battery. The battery is connected separately to the wire harness. The wire harness is not shown in the figures.

Engine variants I2 846 MAR TC-80, TC-100 and TC-120

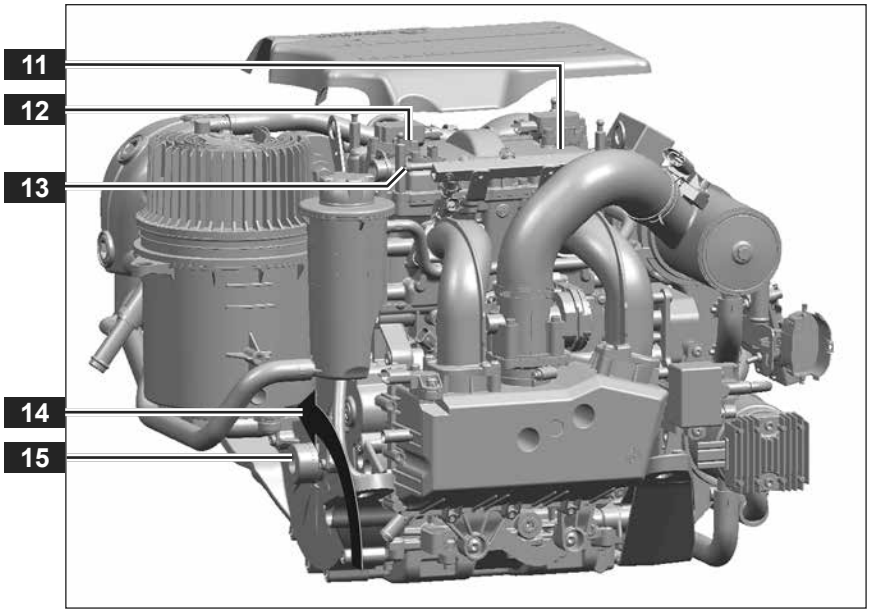
- Oil filter 1
- Drainage for storage 2
- Fuse box 3
- Waste gate valve 4
- Flame arrester 5
- Heat exchanger 6
- Connection for flushing device sea water cooling circuit 7



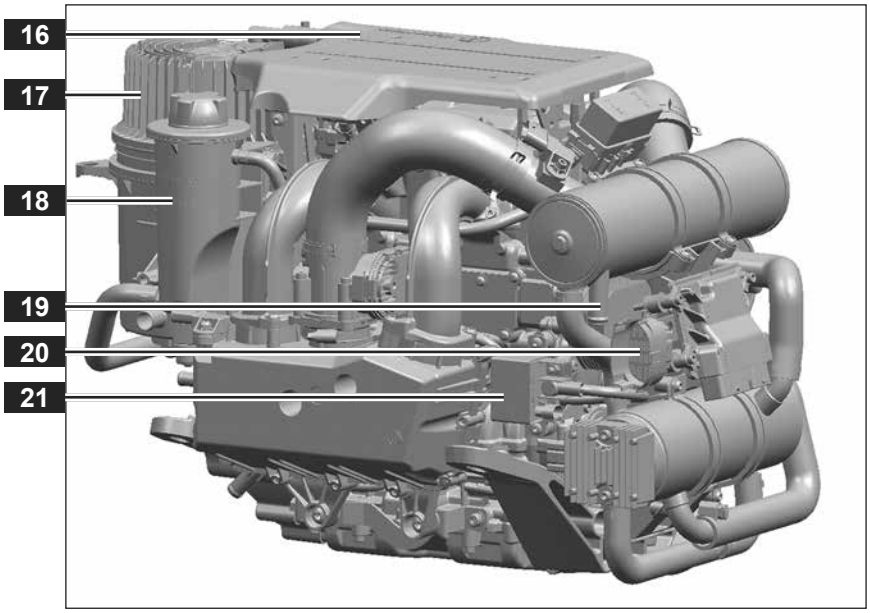
- Sacrificial anode 8
- Exhaust pipe 9
- Sea water return 10



- 1st cylinder 11
- 2nd cylinder 12
- Fuel supply 13
- Engine rotation direction 14
- Stub shaft 15

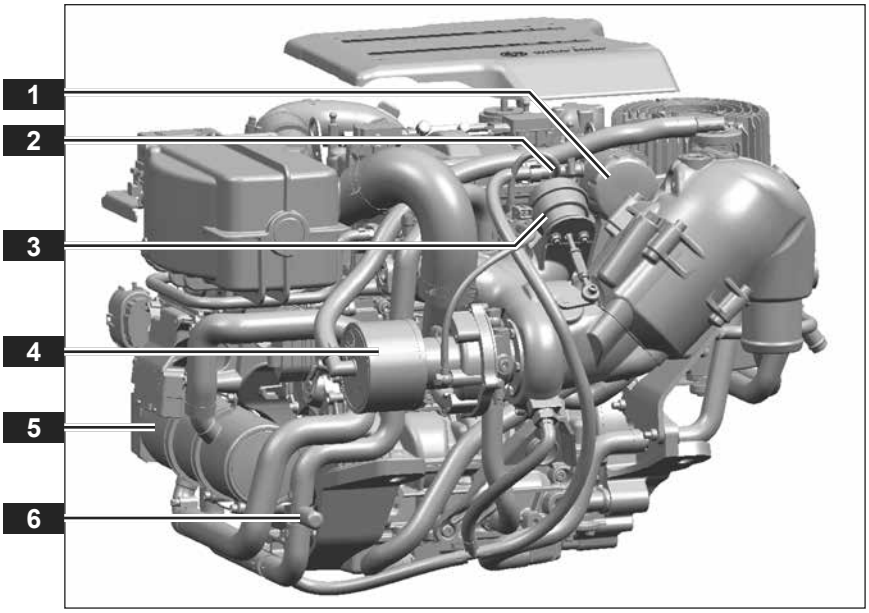


- Engine cover 16
- Oil tank 17
- Expansion tank coolant 18
- Sea water supply 19
- Vehicle connector "Engine-Chassis" 20
- Relay starter 21

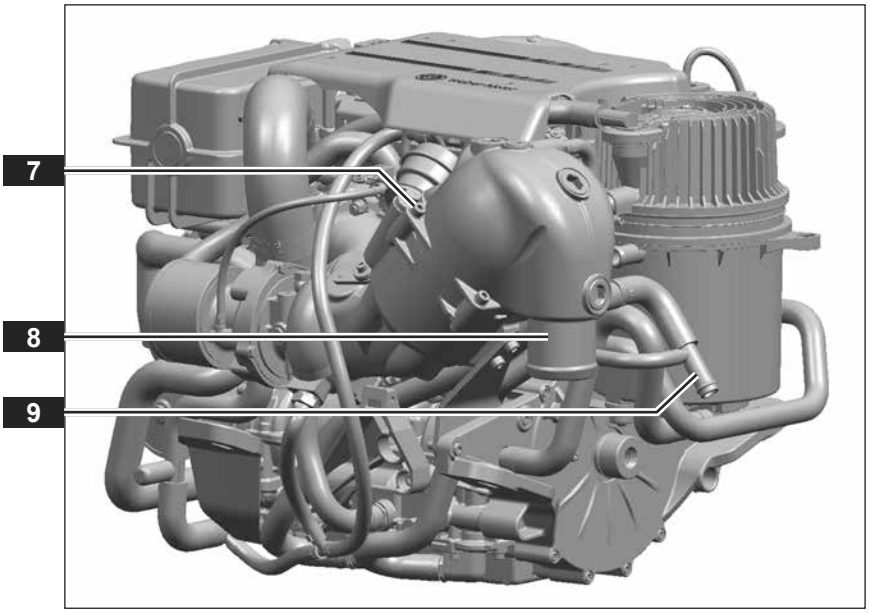


Engine variant
I2 846 MAR TC-155

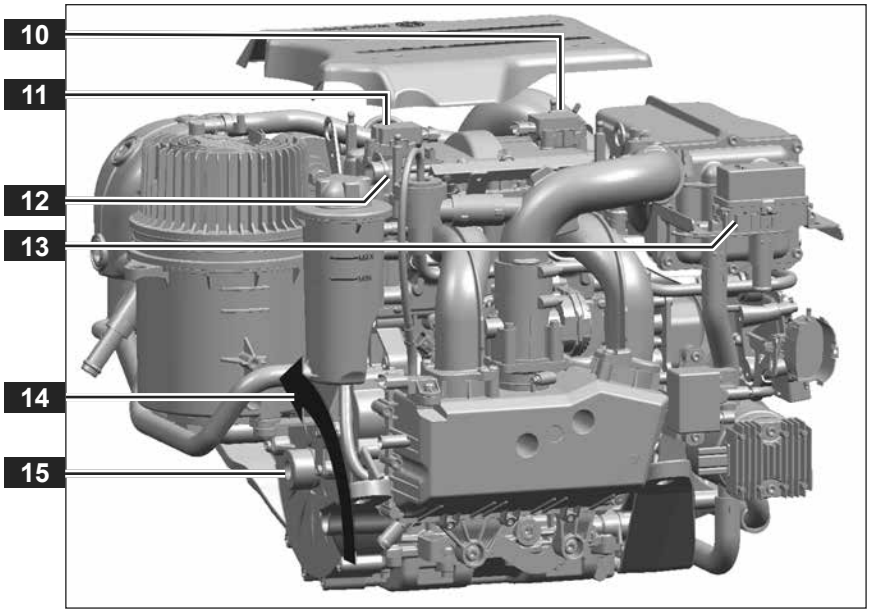
- Oil filter 1
- Drainage for storage 2
- Waste gate valve 3
- Flame arrester 4
- Heat exchanger 5
- Connection for flushing device sea water cooling circuit 6



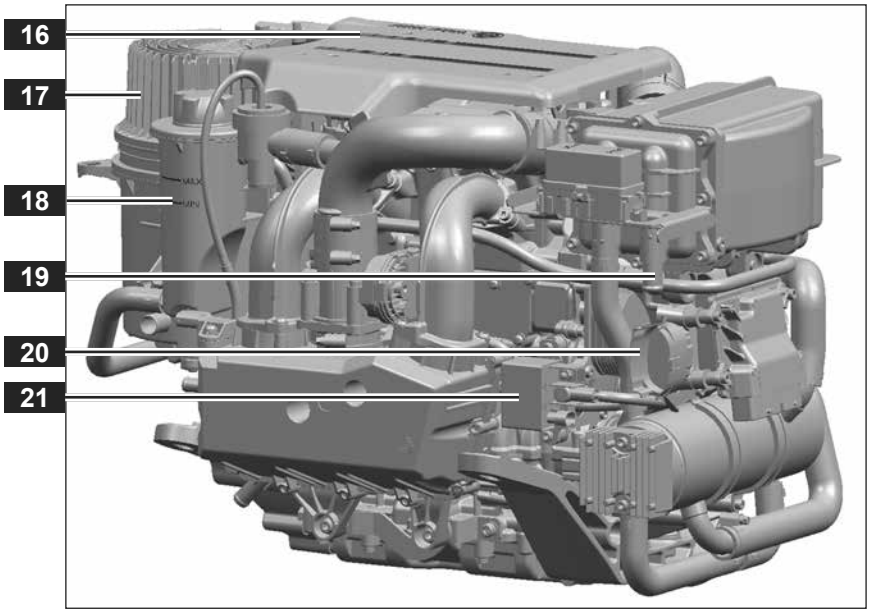
- Sacrificial anode 7
- Exhaust pipe 8
- Sea water return 9



- 1st cylinder 10
- 2nd cylinder 11
- Fuel supply 12
- Fuse Box 13
- Engine rotation direction 14
- Stub shaft 15



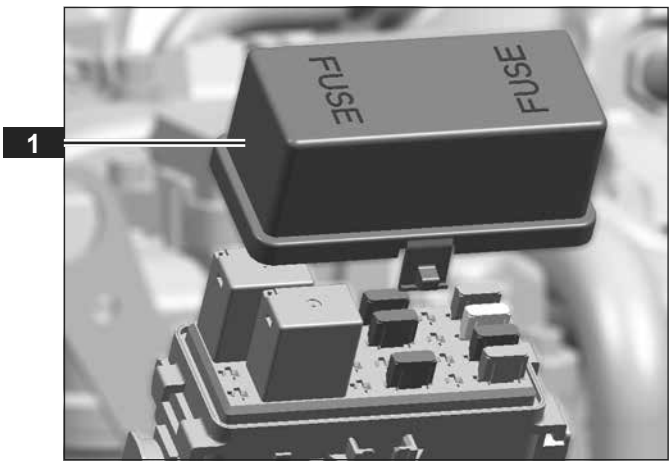
- Engine cover 16
- Oil tank 17
- Expansion tank coolant 18
- Sea water supply 19
- Vehicle connector "Engine-Chassis" 20
- Relay starter 21



3.7 Engine fuses and relays

The engine fuses and relays are located in the fuse box on the engine. (See chapter 3.6 Engine components and information.)

► Remove the cover 1 from the fuse box.



Overview configuration fuses and relays

1 Relay “MAIN”, relay main

2 Relay “FUEL“, relay fuel pump

3 15 A fuse “IGK“, terminal 30 key switch

4 15 A fuse “VBD“, terminal 30 battery

5 15 A fuse “SERVICE“, electric circuit for ignition coils, injectors

6 10 A spare fuse “SPARE“

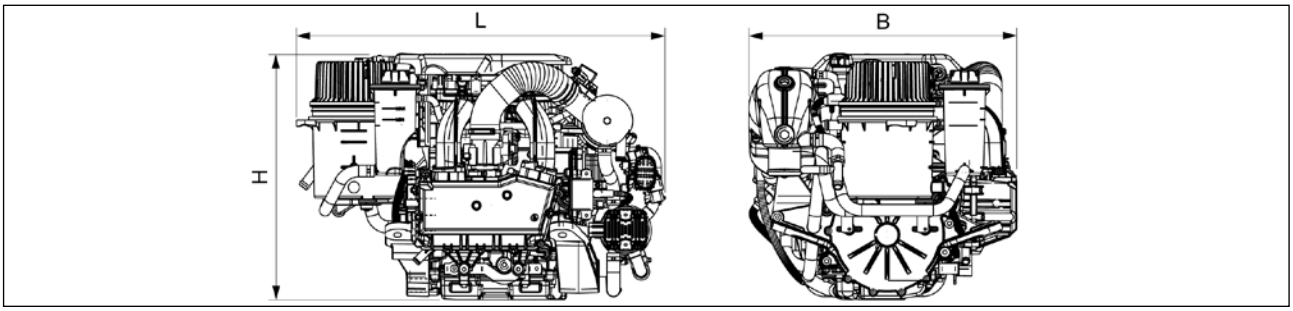
7 10 A fuse „FUEL“, fuel pump

8 15 A fuse „VBR“, terminal 30 after relay main

9 15 A spare fuse “SPARE“

3.8 Technical specifications

Engine variant I2 846 MAR	TC-80	TC-100	TC-120	TC-155
Type	4-Takt-Otto-Motor, Parallel-Twin mit Ausgleichswelle und oben liegender Nockenwelle (SOHC)			
Displacement	846 cm³			
Number of cylinders	2			
Bore x stroke	89 x 68 mm [3.5 x 2.7 in]			
Compression ratio	9 : 1			
Engine power ISO 8178	58,5 kW @ 6600 min^{-1} [rpm]	74 kW @ 7200 min^{-1} [rpm]	91 kW @ 7500 min^{-1} [rpm]	112 kW @ 7500 min^{-1} [rpm]
Engine power SAE J1228	59 kW @ 6600 min^{-1} [rpm]	75 kW @ 7200 min^{-1} [rpm]	92 kW @ 7500 min^{-1} [rpm]	113 kW @ 7500 min^{-1} [rpm]
Engine speed limit	8000 min^{-1} [rpm]			
Idle speed	1600 min^{-1} [rpm]			
Carburation	Sequential multipoint intake manifold injection			
Lubrication system	Dry sump			
Cooling system	Closed coolant circuit and open sea water cooling circuit			
Engine management system	Synerject M3D			
Throttle body	Electronically controlled, dia. = 44 mm [1.73 in]			
Ignition system	Electronically controlled distributorless ignition system with single spark ignition coils			
Starter system	Electric starter			
Generator, internal	> 450 W @ 4000 min^{-1} [rpm]			
Fuses	Automotive fuses mini blade-type 10 A and 15 A			
Weight including engine oil and coolant	95 kg [209 lb]	95 kg [209 lb]	95 kg [209 lb]	100 kg [221 lb]
Dimensions L	743 mm [30 in]			
Dimensions B	539 mm [22 in]			
Dimensions H	509 mm [20 in]			



4 Operation

Familiarize yourself with the vehicle before operating the engine. Read the vehicle manufacturer‘s documentation.

4.1 Service intervals

In order to keep your engine in a safe operating condition, regular servicing is essential.

Following service tasks you can perform yourself.

	before driving	daily or after driving	every 10 h[1]
Inspecting exhaust and fuel system	■		
Checking coolant level	■		
Checking oil level	■		
Flushing sea water cooling circuit		■[2]	■[2]
Corrosion protection			■[2]

1 h = hours of operation
2 only after operating in salt water

Information! The engine management system supports the feature of a service light. Read the vehicle manufacturer‘s documentation for more information.

The following service tasks require mechanical knowledge and special technical knowledge of this engine. These service tasks must be performed in a workshop authorized by Weber Motor or the vehicle manufacturer.

	1st service	Subsequent service intervals			Preparing for storage[3]
	after 12 h or not later than 25 h	every 60 h or at least once a year	every 120 h or at least every 2 years	every 360 h or at least every 4 years	
Changing engine oil and oil filter	■	■			■
Checking and adjusting valve play	■		■		
Replacing spark plugs			■		
Replacing ignition coils				■	
Replacing rubber mount				■	
Adjusting waste gate valve				■	
Checking flame arrester				■	
Flushing sea water cooling circuit		■			■
Checking sacrificial anode		■			■
Corrosion protection		■			■
Checking spark plugs Fuel stabilizer Engine internal preservation Inspecting exhaust and fuel system					■
Changing coolant	after 4 years[4]				
Replacing fuel filter	See the vehicle manufacturer‘s documentation.				

[3] if you do not intend to operate the engine for more than 30 days
[4] observe the coolant manufacturer‘s recommendations for the following service intervals

4.2 Operation during the break-in period

The way you operate the engine during the first five hours of operation is a major factor in achieving the required performance and extending the service life of the engine.

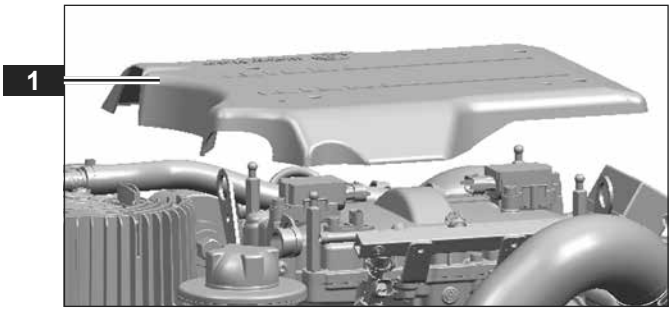
Observe the following points to ensure that the engine parts break in properly:

Avoid	engine speeds over 6000 min^{-1} [rpm]
	long periods of idle operation
	long operating periods at low engine speeds
	long operating periods at the same engine speed
	long operating periods at full load
Good	changes in engine speed
	when the engine is warm, momentary bursts of acceleration

4.3 Service before driving

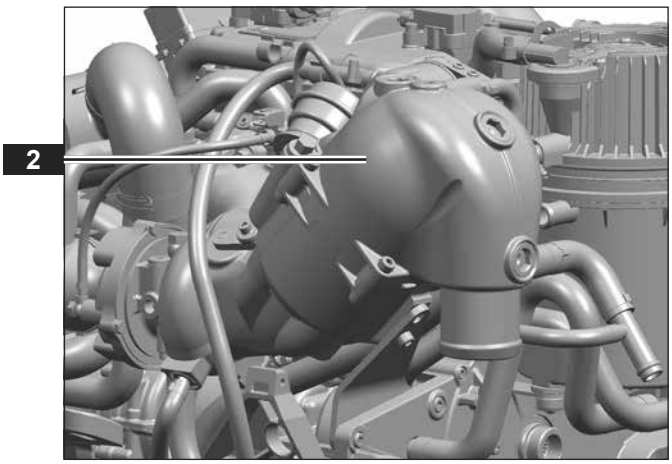
4.3.1 Inspecting the exhaust and fuel system

► Remove the engine cover 1.



Exhaust system

WARNING! Engine exhaust gases contain carbon monoxide (CO). Inhalation of carbon monoxide can deprive the body of oxygen and result in organ damage or even death by asphyxiation.

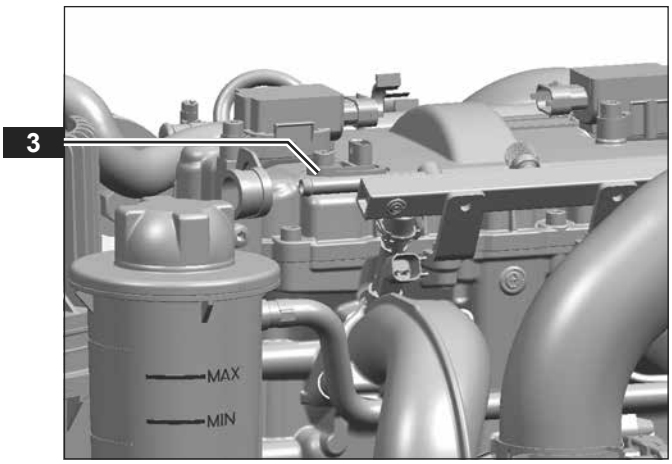


► Check if hose clamps, bolts or metal parts of the exhaust system 2 have noticeable corrosion.

► Check if hoses are mounted properly and if cracks have been formed on hoses.

Fuel system

WARNING! Fuel is highly flammable. Vapors may ignite and cause an explosion.



► Check if hose clamps, bolts or metal parts of the fuel system 3 have noticeable corrosion.

► Check if hoses are mounted properly and if cracks have been formed on hoses.

► Do not start the engine if there is a smell of fuel or you suspect that fuel is leaking.

► Attach and press down the engine cover until it is snapped.

4.3.2 Checking coolant level

Check the coolant level with a cold engine.

► Check the coolant level in the expansion tank 1.

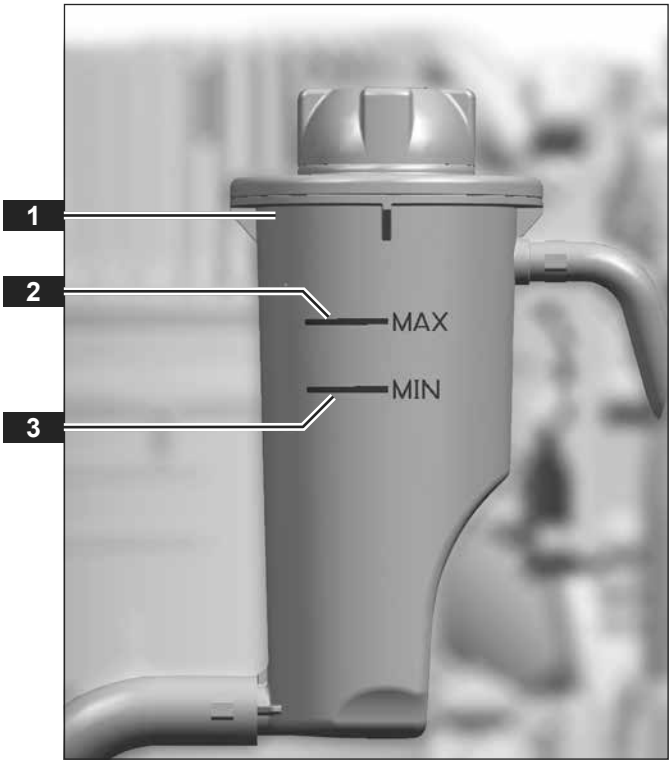
> The coolant level must be between the MIN-marking 3 and the MAX-marking 2.

NOTICE! Danger of overheating caused by a lack of coolant.

► When coolant level is below the MIN-marking, continue with the section **Refilling coolant**.

NOTICE! Leaks in the hoses due to increased pressure.

► When the MAX-marking is exceeded, pump out excessive coolant with a suction pump.



Refilling coolant

CAUTION! Scalding caused by hot steam. Open expansion tank only with a cold engine.

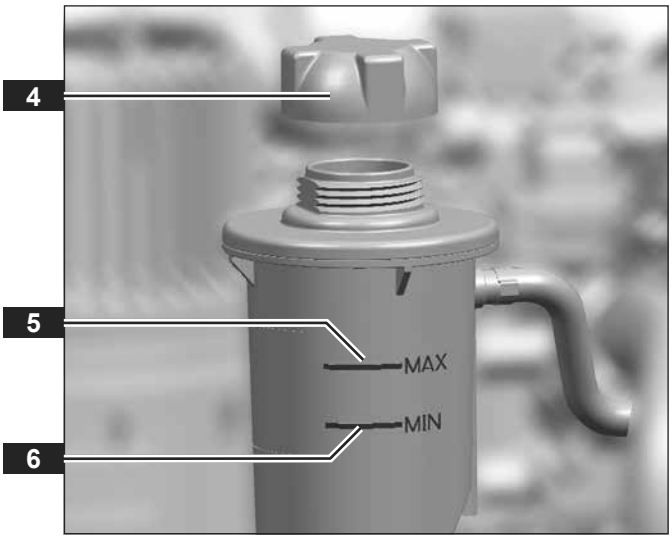
► Unscrew the expansion tank cover 4.

► Refill coolant, until the coolant level is between the MIN-marking 6 and the MAX-marking 5.

► Close the expansion tank.

► Allow the engine to run at idle for 10 seconds.

► Check the coolant level.



4.3.3 Checking oil level

Information! Your engine uses a dry sump lubrication system. Engine oil is pumped from the engine into the oil tank while the engine is operating. When the engine is switched off, a portion of the engine oil flows from the oil tank slowly back into the engine. Therefore inspect the oil level immediately after switching off the engine.

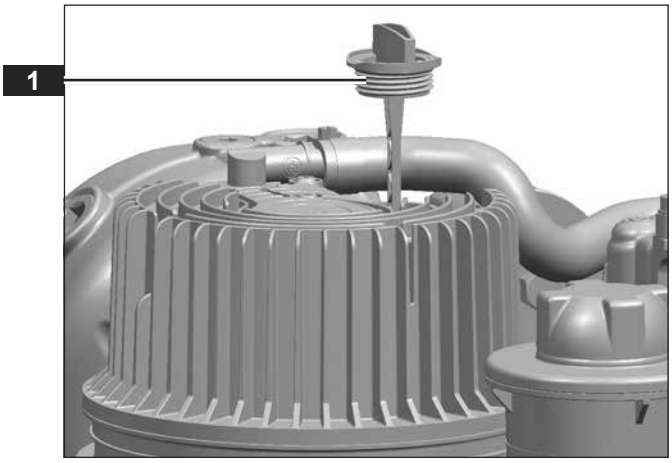
Check the oil level with a warm engine.

► Warm up the engine. (See the vehicle manufacturer‘s documentation.)

CAUTION! Scalding caused by hot engine oil. Wear protective gloves.

► Unscrew the oil dipstick 1 at the oil tank.

► Wipe the oil dipstick and insert into the oil tank. Do not screw in.



► Remove the oil dipstick 2 and check oil level.

> The oil level must be between the MIN-marking 4 and the MAX-marking 3.

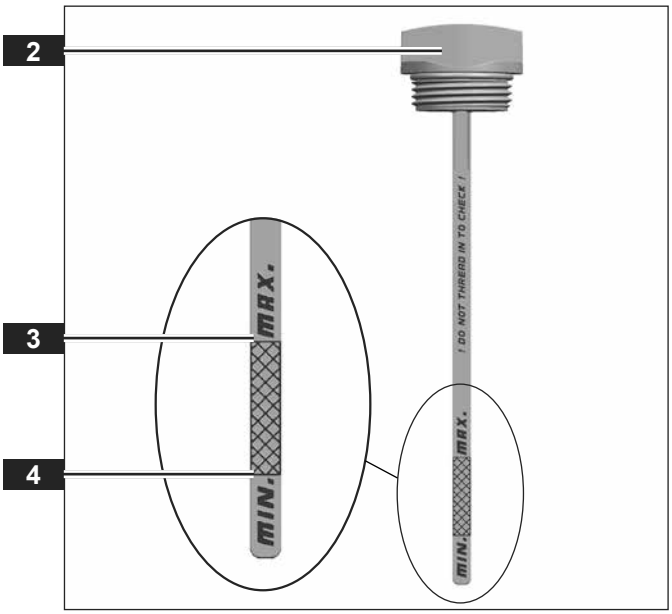
NOTICE! Engine damage caused by a lack of engine oil.

► When oil level is below the MIN-marking, continue with the section **Refilling engine oil**.

NOTICE! Engine damage caused by too much engine oil.

► When oil level is exceeded the MAX-marking, pump out excessive engine oil with oil suction pump.

► Screw in the oil dipstick.

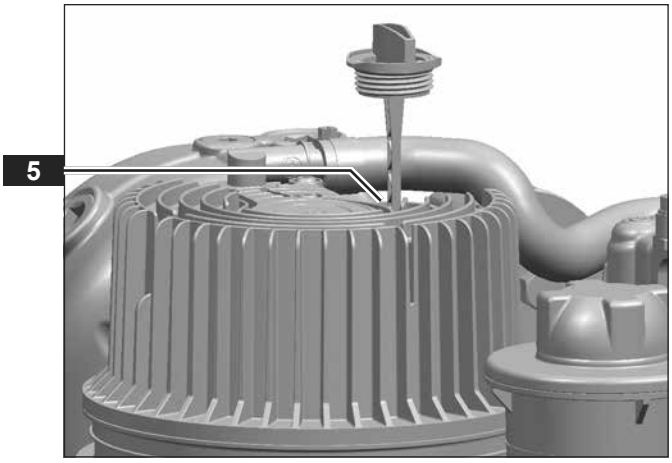


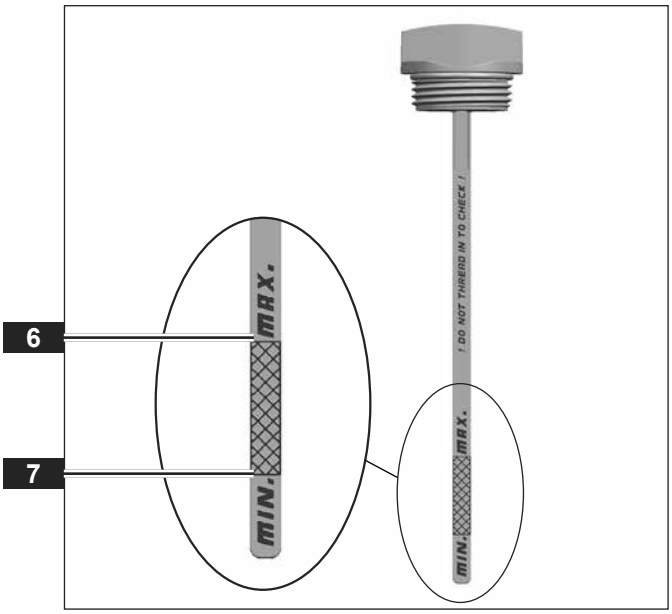
Refilling engine oil

NOTICE! Engine damage caused by too much engine oil. Refill engine oil in small quantities with repeatedly checking. The difference between the MIN-marking **7** and the MAX-marking **6** is approximately 0,5 liter [0.5 qt (US)] engine oil.

► Fill engine oil through the opening **5** of the oil dipstick until the oil level is between the MIN-marking and the MAX-marking.

► Check the oil level.





4.4 Service after driving

4.4.1 Flushing sea water cooling circuit

Information! Regularly use a cleansing concentrate to flush the sea water cooling circuit. Consult your local vehicle dealer.

NOTICE

Damage in exhaust system caused by deposits.

If the sea water cooling circuit is not flushed regularly after driving, sediments appear. Particularly within the cooling jacket of exhaust system.

► Flush the sea water cooling circuit after each drive in salt water.

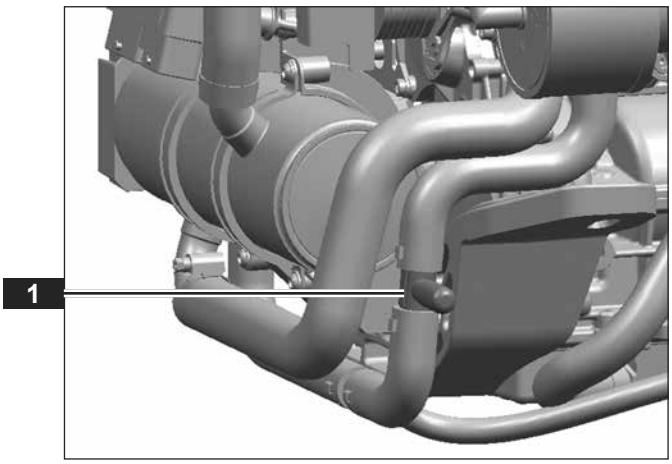
► Take the vehicle out of water.

A 13 mm [1/2“] connection **1** for the flushing device is installed at the engine. The flushing device is attached at this connection.

► Connect the flushing device. (See the vehicle manufacturer‘s documentation.)

NOTICE! Engine damage due to water in the engine. When the engine is switched off, the water may get into the engine through the exhaust system. First start the engine and then open the water tap.

NOTICE! Engine damage caused by overheating. Operate the engine without supply of water only at idle and only for a maximum period of 30 seconds.



► Start the engine and run the engine at idle.

► Open the water tap.

The sea water cooling circuit will be flushed. Weber Motor recommends to flush the sea water cooling circuit at least for 5 minutes.

► Close the water tap.

► Switch off the engine.

► Remove the flushing device.

4.4.2 Corrosion protection

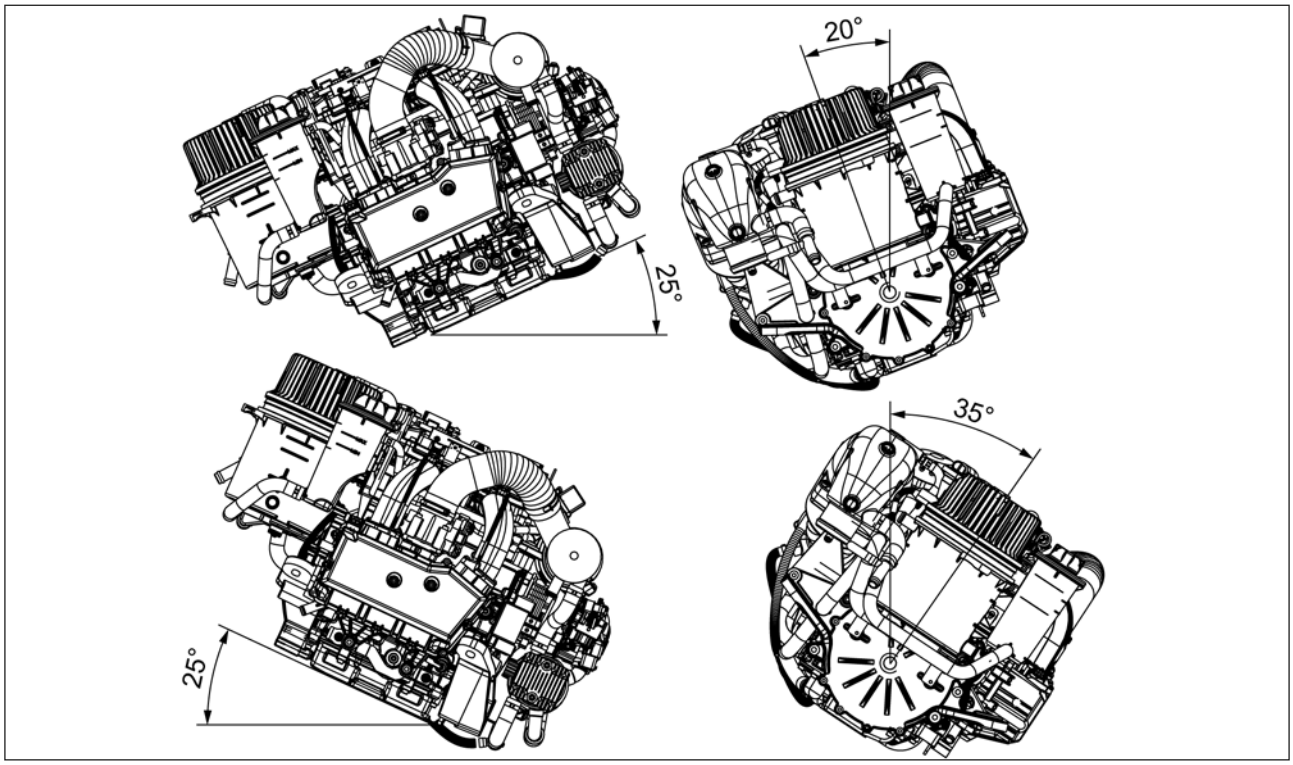
Information! For information about suitable products and their using, please consult your local vehicle dealer.

If you operate your vehicle in salt water, regularly use a corrosion protection spray. (See chapter 4.1 Service intervals.)

4.4.3 Transport and storage of the vehicle

If you intend to transport or place the vehicle in storage, read the following instructions:

- ► If you do not intend to operate the engine for 30 days or more, prepare the engine for storage. (See chapter 5.1 Engine idle for more than 30 days.)
- ► Transport and store the vehicle on a preferably stable and flat surface. If you do not have any flat surface available, note for storage necessarily the angles in the figure. Do not exceed these angles.
- ► Store the vehicle in a clean, dry place with an ambient temperature of -30 – 45 °C [-22 – 113 °F].



5 Special scenarios

5.1 Engine idle for more than 30 days

If you do not intend to operate the engine for 30 days or more, prepare the engine for storage. Preparing the engine for storage will prevent the cylinder from corroding and ensure the engine starts again correctly at the end of the storage period.

Preparations for storage require special technical knowledge. Preparations must be performed in a workshop authorized by Weber Motor or the portable fire pump manufacturer.

5.2 Operating engine without sea water

NOTICE

Engine damage caused by overheating.

If you operate the engine without sea water, the optimal engine cooling is no longer provided. Select one of the following procedures.

- ► Operate the engine only at idle and only for a maximum period of 30 seconds.
- ► Flush the sea water cooling circuit. (See chapter 4.4.1 Flushing sea water cooling circuit.)

5.3 Towing vehicle in water

NOTICE

Engine damage due to water in the engine.

If you tow the vehicle in water, the water may get into the engine through the exhaust system.

- ► If your vehicle has a towing valve or a similar device, close it. Read the vehicle manufacturer‘s documentation for more information.
- ► Without a towing valve tow the vehicle only for a short time with maximum speed of 16 km/h [10 mph] [9 knots].

5.4 Measures in case of flooded engine

NOTICE

Engine damage due to water in the engine.

If your vehicle has been capsized and/or the engine has been flooded, the water may get into the engine through the exhaust system. It can still happen even if the engine has been partially flooded. The longer you postpone the necessary service tasks, the more severe will be the engine damage.

- ► Do not try to start the engine.
- ► Remove the water from the engine immediately.
- ► Do not waste your time. Contact immediately or at least within 24 hours a workshop authorized by Weber Motor or the vehicle manufacturer.

6 Malfunctions

6.1 Malfunctions table

If you cannot correct a malfunction yourself using the malfunctions table below, contact a workshop authorized by Weber Motor or the vehicle manufacturer immediately.

Malfunction	Possible cause	Remedy
The engine warning light (MIL) is flashing.	There is an emission-related malfunction.	Contact immediately a workshop authorized by Weber Motor or the vehicle manufacturer.
The engine warning light (MIL) is illuminating.	There is a malfunction.	
The engine warning light (MIL) does not illuminate after engine start.	The engine warning light comes on after starting the engine for a few seconds. If the (MIL) engine warning light is not on, an error has occurred.	
The temperature warning light is flashing or illuminating.	Too high engine temperature.	
The oil pressure light is on.	The oil pressure light comes on after starting the engine until the required oil pressure has built up. If the oil pressure light does not go out, an error has occurred.	Do not start the engine. Contact immediately a workshop authorized by Weber Motor or the vehicle manufacturer.
The service light is illuminating.	There is no malfunction. Service tasks must be performed.	The service tasks must be performed in a workshop authorized by Weber Motor or the vehicle manufacturer.

Malfunction	Possible cause	Remedy
The engine does not crank.	The ignition is turned off.	Turn on ignition.
	The power supply of vehicle is disconnected for safety reasons.	Depending on equipment of the vehicle there are several options. Read the vehicle manufacturer‘s documentation for more information. For example: Insert the safety lanyard. Put the throttle control in neutral position. Switch on the battery isolator.
	After start failure the starter can stay disabled for a few seconds.	Wait a few seconds and start the engine again.
	A fuse is defective.	Check the engine fuses. (See chapter 6.2 Checking engine fuses.) Check the fuses located in the vehicle. See the vehicle manufacturer's documentation.
	The battery is discharged or defective.	Contact immediately a workshop authorized by Weber Motor or the vehicle manufacturer.
	The drive train is blocked.	Remove the blockage. See the vehicle manufacturer's documentation.
The engine cranks, but does not start.	A fuse is defective or the service fuse is unplugged.	Check the engine fuses or plug in the service fuse. (See chapter 6.2 Checking engine fuses.) Check the fuses located in the vehicle. See the vehicle manufacturer's documentation.
	Lack of fuel.	Fill up fuel. See the vehicle manufacturer's documentation.
	The battery is discharged or defective.	Contact immediately a workshop authorized by Weber Motor or the vehicle manufacturer.

Malfunction	Possible cause	Remedy
The engine stalls and can be started again.	Lack of fuel.	Fill up fuel. See the vehicle manufacturer's documentation.
The engine stalls and cannot be started again.	No fuel.	Fill up fuel. See the vehicle manufacturer's documentation.
The engine does not provide the full power.	There is no malfunction. The engine has not reached the operating temperature yet.	–
	There is a malfunction and a speed limitation is activated.	Contact immediately a workshop authorized by Weber Motor or the vehicle manufacturer.

6.2 Checking engine fuses

⚠ WARNING

Risk of fire caused by incorrect or bridged fuse.

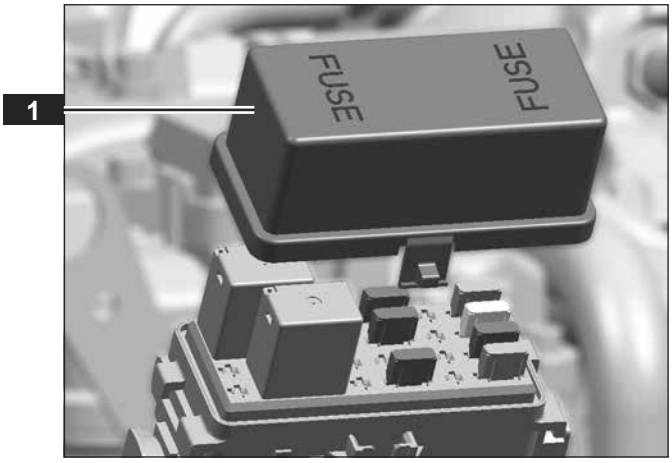
The fuse protects the cable from cable fire. A higher amperage rating bypasses this protection.

- ► Never use a higher ampere rating.
- ► Never bypass a fuse.

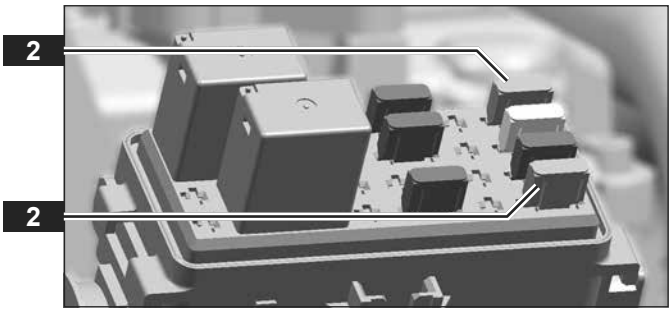
► Disconnect the engine from the power supply. (See the vehicle manufacturer‘s documentation.)

The engine fuses and relays are located in the fuse box on the engine. (See chapter 3.6 Engine components and information.)

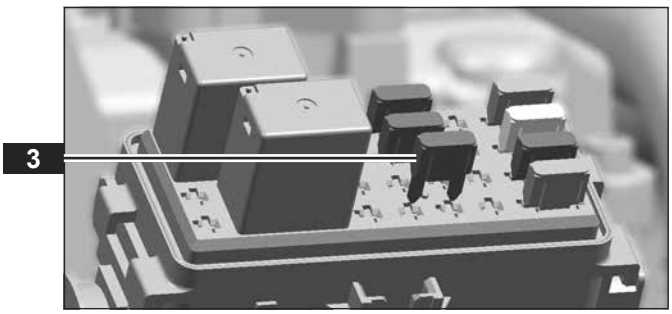
► Remove the cover 1 from the fuse box.



Two spare fuses 2 provided by Weber Motor can be found in the fuse box. (See chapter 3.7 Engine fuses and relays.)



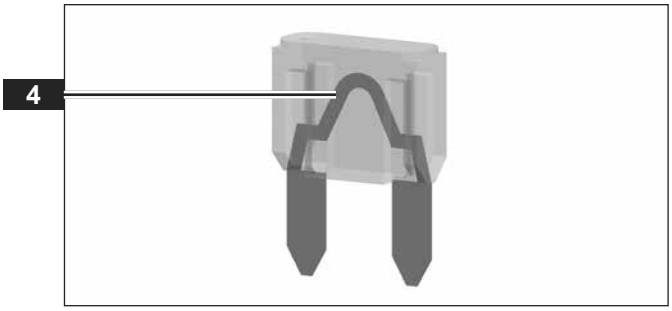
► Remove the fuse 3.



► Check the fuse.

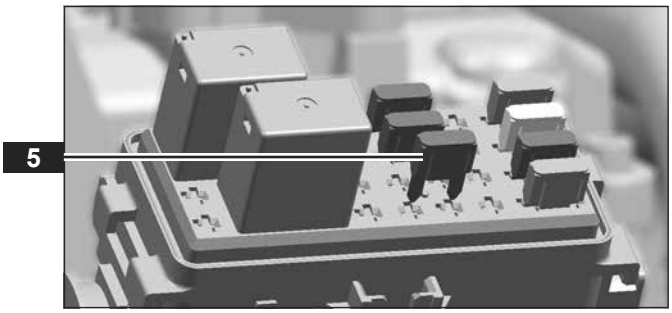
The wire 4 in the fuse must to be intact.

► If the wire is damaged, replace the fuse.



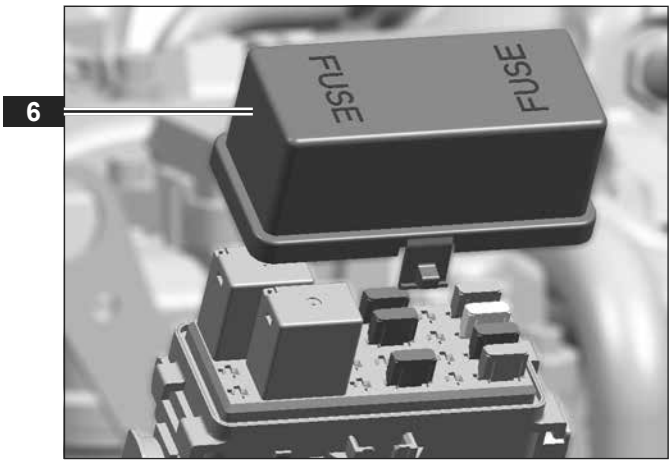
► Insert the fuse 5.

► Repeat the procedure with other fuses.



► Insert the cover 6 into the fuse box.

► Connect the power supply to the engine. (See the vehicle manufacturer‘s documentation.)



7 Dealer and servicing network

7.1 Locating a workshop

An extensive global dealer and servicing network is available. The dealer and servicing network provides assistance with any queries relating to the engine. Visit our web site www.weber-motor.com for a list of all authorized Weber Motor workshops.

7.2 Service and spare parts

Weber Motor offers a selection of accessories to prepare you for the most important situations. Visit your local vehicle dealer or our web site www.weber-motor.com for more information.

7.3 Repairs

Repairs require mechanical knowledge and special technical knowledge of this engine. Weber Motor recommends you have any repairs performed by a workshop authorized by Weber Motor or the vehicle manufacturer.

7.4 Warranty

In the case of warranty claims, always consult a workshop authorized by the vehicle manufacturer. If that is not possible, contact your local vehicle dealer.

8 Service tasks in the workshop

8.1 Safety messages workshop

Service tasks in the workshop

All service tasks described in the following chapter require mechanical knowledge and special technical knowledge of this engine.

► All service tasks described in chapter 8 **Service tasks in the workshop** must be performed by a workshop authorized by Weber Motor or the vehicle manufacturer.

Service manual

Before reading chapter 8 **Service tasks in the workshop**, you must have read and understood all other information in the service manual.

► Read through the service manual carefully before performing any service tasks. Pay particular attention to the safety messages.

Engine power supply

All service tasks require disconnection of the engine from the power supply. Starting the engine inadvertently may endanger the safety of personnel.

Read the vehicle manufacturer‘s documentation for more information.

► Disconnect the engine from the power supply before performing any servicing tasks.

► Only reconnect the power supply to the engine once all service tasks are complete and all protective equipment is correctly fitted.

Workspace

Performing the service tasks on the vehicle located in water may endanger the safety of personnel.

► Take the vehicle out of water to perform any service tasks.

Protective equipment

Missing protective equipment poses a safety risk to personnel.

► Attach all protective equipment after completing the service tasks.

Tools

Unsuitable tools pose a safety risk to personnel.

► Always use tools listed in chapter 8.2 **Tools and accessories**.

Spring band clamps

Serious eye injuries caused by sudden release of spring band clamps.

- ► Wear protective glasses, also people in the nearby working place.
- ► Use only suitable tools, as described in Section 8.2 **Tools and accessories**.
- ► Observe the tool manufacturer‘s installation instructions.

8.2 Tools and accessories

8.2.1 Weber Motor service parts

Weber Motor offers a service case that contains the following service parts. Visit your local vehicle dealer or our web site www.weber-motor.com for more information.

Figure	Description
	Oil filter
	O-rings for oil filter change
	Spark plug Champion RC7PYCBX
	Feeler gauge 0,05 – 2 mm
	Sealing kit valve cover

Figure	Description
	Valve adjustment shims in different sizes
	Serrated lock washer
	Valve adjustment kit
	Sacrifical anode including seal
	Seal for sacrifical anode

For the service intervals every 4 years, you also need the following parts:

Figure	Description
	Ignition coil

Figure	Description
	Rubber mount

8.2.2 Weber Motor diagnostic case

Weber Motor offers a diagnostic case that contains the Weber Diagnostic Tool. The Weber Diagnostic Tool is designed for fault diagnostics and service tasks for Weber engines using a Synerject engine management system. Visit your local vehicle dealer or our web site www.weber-motor.com for more information.

8.2.3 Equipment workshop

In addition to the service case, you will require the following tools and accessories for service tasks. The figures are only examples of suitable tools. All tools and accessories are available from specialist retailers.

Figure	Description
	Torque wrench 2 – 50 Nm [1 – 37 lbf ft] with extension and insert adapter
	Reversible ratchet with extension and insert adapter
	Hexagon screwdriver 5
	Hexagon screwdriver socket 5
	Torx® screwdriver T30
	Torx® screwdriver socket T30
	Hexagon nut-driver 7

Figure	Description
	6-point socket wrench 7
	Open-end wrench 10, 15, 17
	Insert open-end wrench 15, 17
	Caliper Measuring accuracy 0,05 mm
	Bar magnet
	Spark plug wrench Wrench size 16 mm [5/8“] Diameter: maximum 22 mm [0.87 in]
	Spark plug brush

Figure	Description
	Oil suction pump
	Drain tray
	Hose clamp pliers for spring band clamps

8.2.4 Supplies

You will require the following supplies to perform service tasks. Unless otherwise specified, use the products as directed by the manufacturer. All supplies are available from specialist retailers.

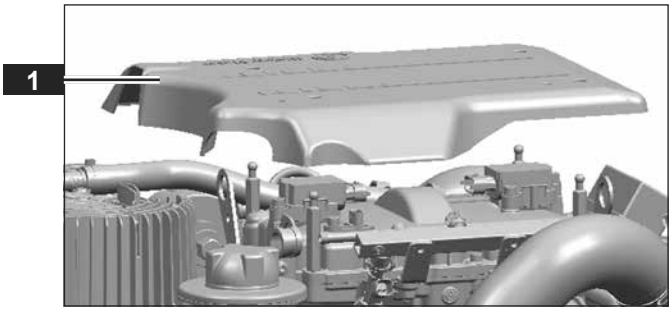
Supplies	Recommended products
Cleansing concentrate for flushing the sea water cooling circuit	Stopsel, Kalyscom France Salt-Away, Salt-Away Products Inc. USA
Anti-Seize assembly paste for lubricating threaded connections	Weicon Anti-Seize "High-Tech" ASW 040 P Loctite 8150
Engine internal preservative	Liqui Moly, Germany
Fuel stabilizer	Liqui Moly, Germany
Sealing surface cleaner	Liqui Moly brake and parts cleaner AIII, Germany
Corrosion protection spray	Würth corrosion protection spray, Germany The product must be salt water resistant and suitable for different surfaces such as metals, paintet surfaces, plastic and rubber.
Lacquer for touching up paintwork defects	DUPLI-COLOR acrylic lacquer silver RAL 9006 DUPLI-COLOR acrylic lacquer white RAL 9010
Flame arrester cleaning spray	K&N Power Kleen, Netherlands

8.3 Changing engine oil and oil filter

Information! The engine oil will be pumped out in two stages. First as much as possible engine oil will be pumped out from the oil tank. The remaining engine oil will be pumped out with the suction pump in the dry sump.

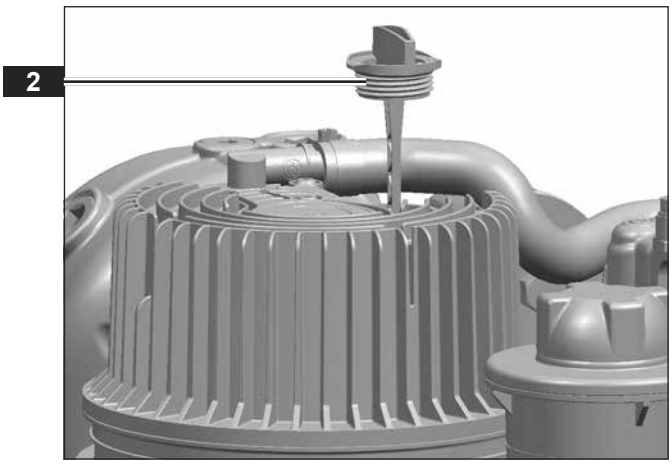
► Warm up the engine. (See the vehicle manufacturer‘s documentation.)

► Remove the engine cover **1**.



CAUTION! Scalding caused by hot engine oil. Wear protective gloves.

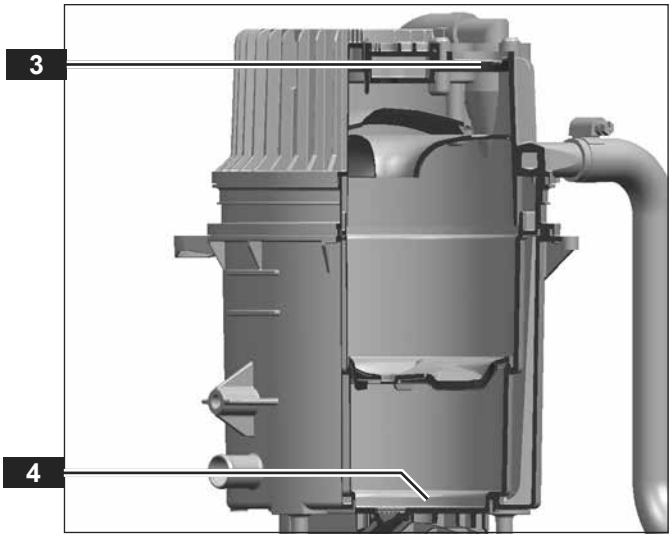
► Unscrew the oil dipstick **2** at the oil tank.



Pumping out engine oil

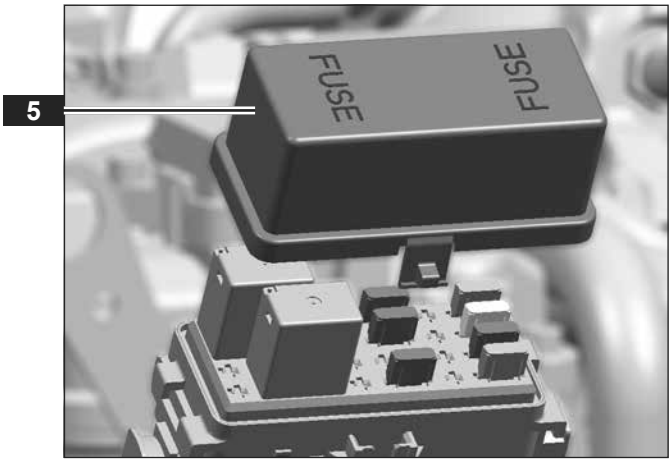
► Insert the suction hose of the oil suction pump through the opening in oil dipstick 3 until the hose reaches the oil tank bottom 4.

► Pump out the engine oil from oil tank.



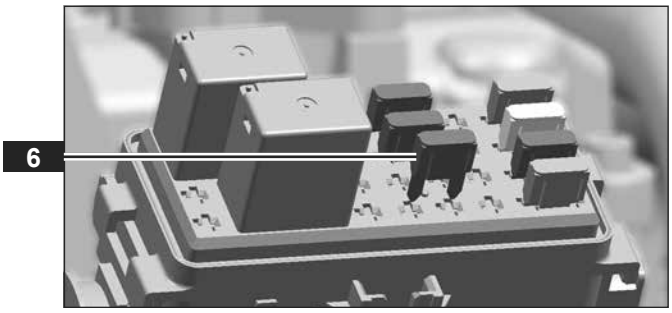
The engine fuses and relays are located in the fuse box on the engine. (See chapter 3.6 Engine components and information.)

► Remove the cover 5 from the fuse box.

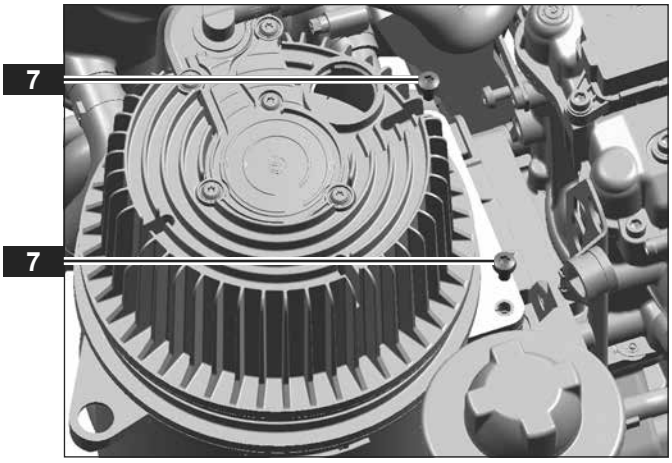


Ignition coils and injectors are supplied with electricity through the service fuse. When the service fuse is removed, you can rotate the engine using the starter avoiding starting the engine.

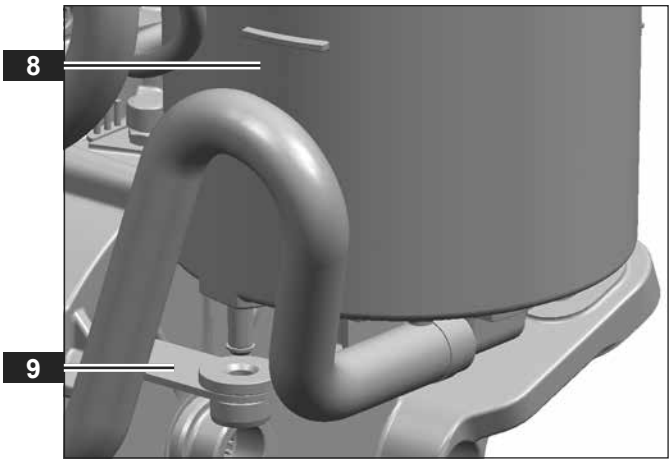
► Remove the service fuse 6.



► Unscrew the bolts 7 on the oil tank.

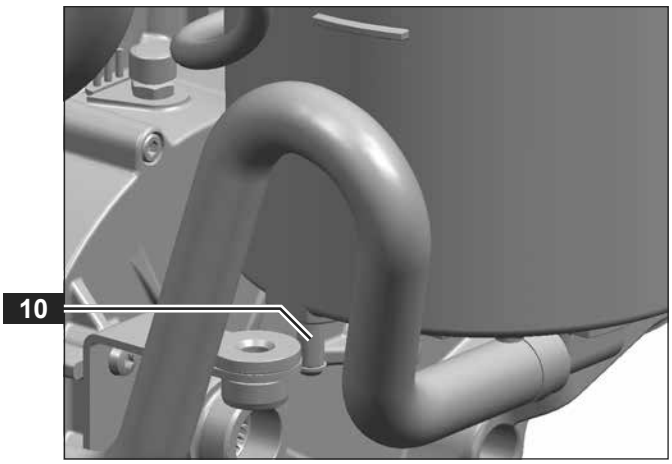


► Lift the oil tank 8 from the oil tank bracket 9.



NOTICE! Breakage risk due to work on the oil tank. When removing the hose from the oil tank, you need to move the oil tank. This can brake the oil tank pins.

► Put the oil tank beside 10 the oil tank bracket.



► Open the hose clamps 11 and 13.

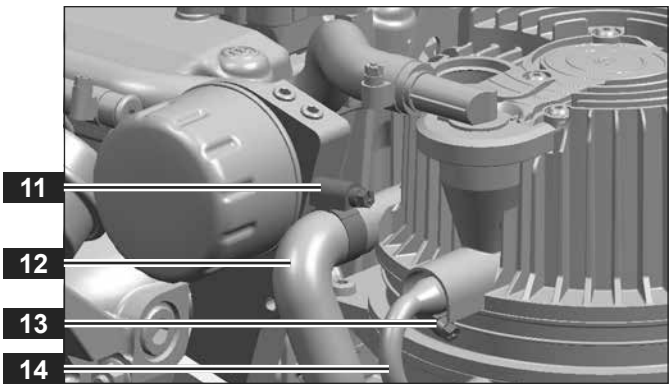
► Hold the hoses 12 and 14 over a drain tray. Extend hoses if necessary.

► Actuate the starter.

The engine cranks and the engine oil will be pumped out of the engine.

The starting sequence will be aborted automatically after a few seconds.

► Wait a moment and repeat the procedure until no more engine oil is being pumped out.



► Connect the hose 18 with the oil tank.

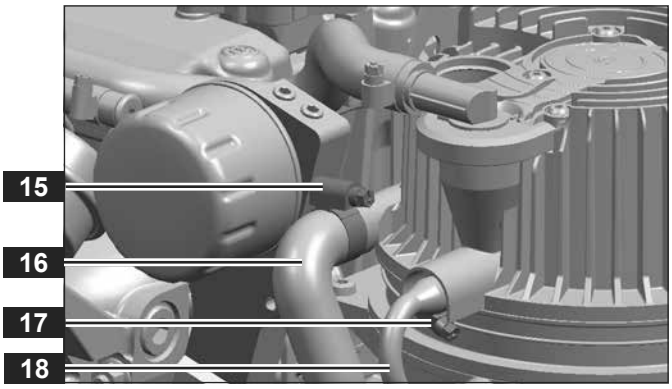
► Close the hose clamp 17.

Tightening torque:
3 Nm +0,5 Nm [2.2 lbf ft +0.4 lbf ft]

► Connect the hose 16 with the oil tank.

► Close the hose clamp 15.

Tightening torque:
5 Nm +0,5 Nm [3.7 lbf ft +0.4 lbf ft]

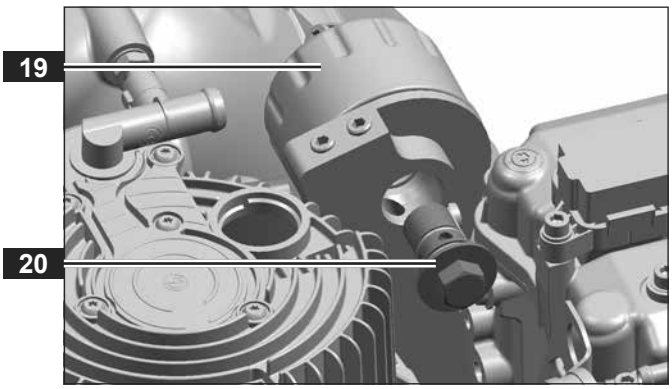


Replacing oil filter

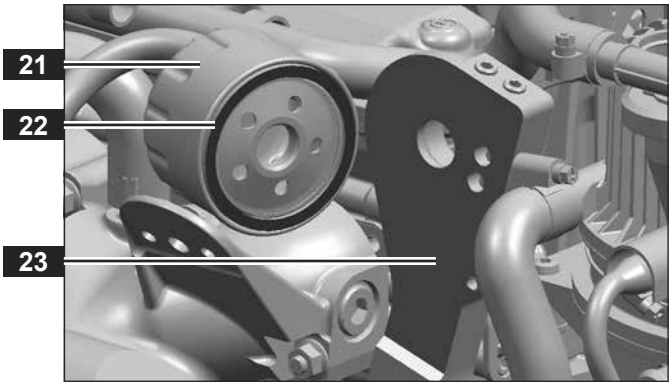
► Hold the oil filter 19.

► Unscrew the banjo bolt 20.

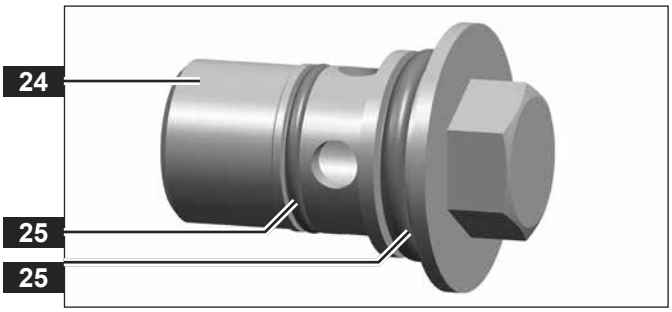
► Remove the oil filter.



- ► Clean the sealing surface 23 with sealing surface cleaner.
- ► Replace the oil filter 21.
- ► Coat the oil filter seal 22 lightly with engine oil.

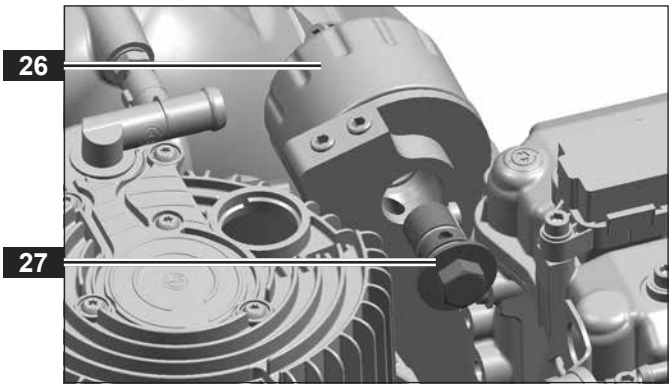


- ► Replace both o-rings 25 on the banjo bolt 24.
- ► Coat the o-rings and thread lightly with engine oil.

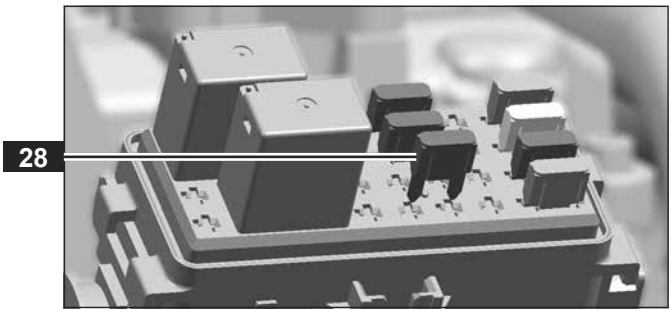


- ► Hold the oil filter 26 in position.
- ► Screw in the banjo bolt 27.

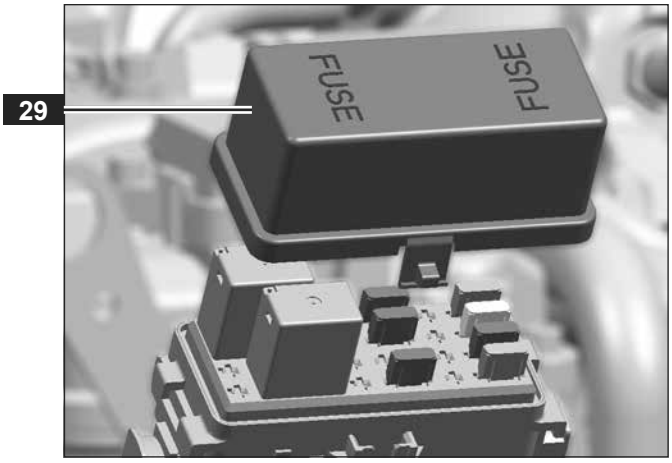
Tightening torque:
14 Nm +2 Nm [10.3 lbf ft +1.5 lbf ft]



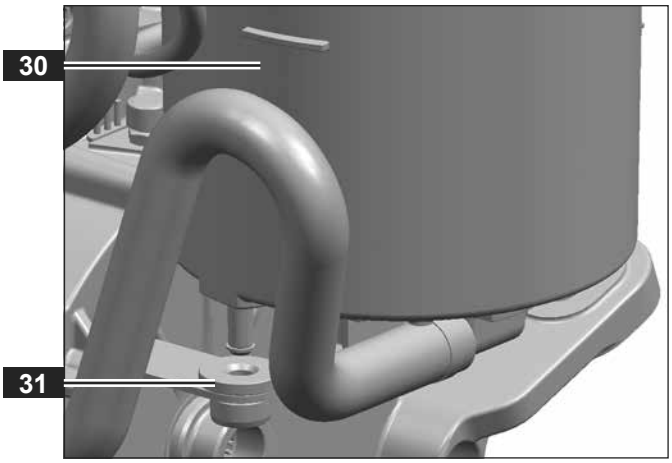
- ► Insert the service fuse 28.



► Insert the cover 29 into the fuse box.

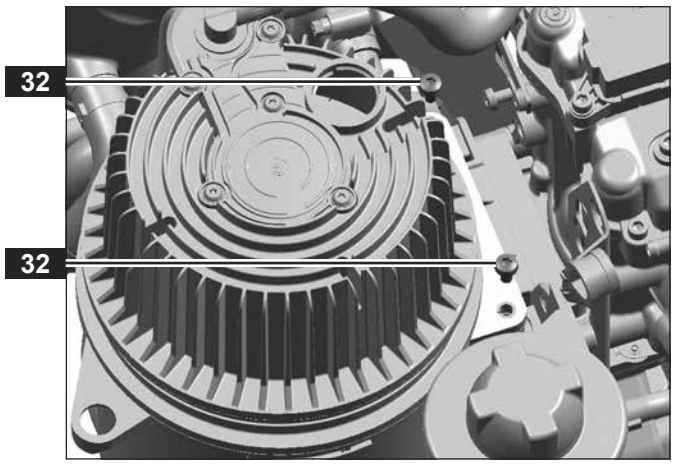


► Lift the oil tank 30 and insert it into the oil tank bracket 31.

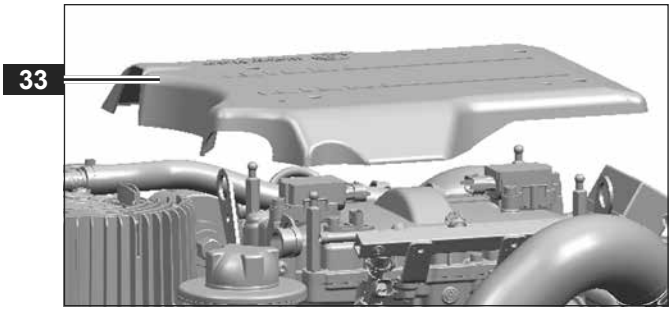


► Screw in the bolts 32 at the oil tank.

Tightening torque:
8 Nm +2 Nm [5.9 lbf ft +1.5 lbf ft]

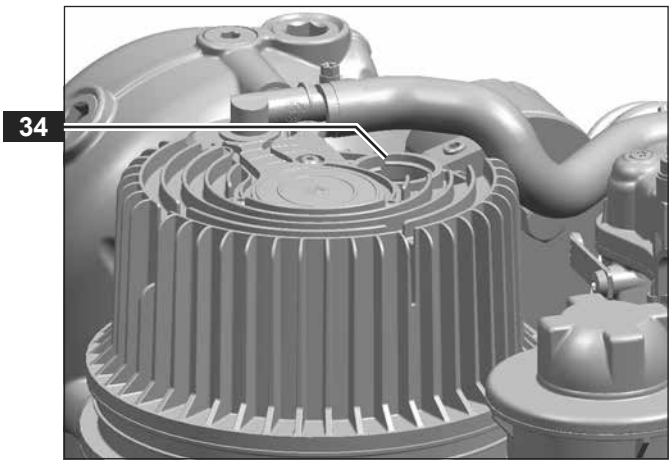


► Place the engine cover 33 and press down the engine cover until it is snapped.



Filling with engine oil

► Fill in 2,5 liter [2.6 qt (US)] of new engine oil through the opening 34 of the oil dipstick.



► Screw in the oil dipstick 35.

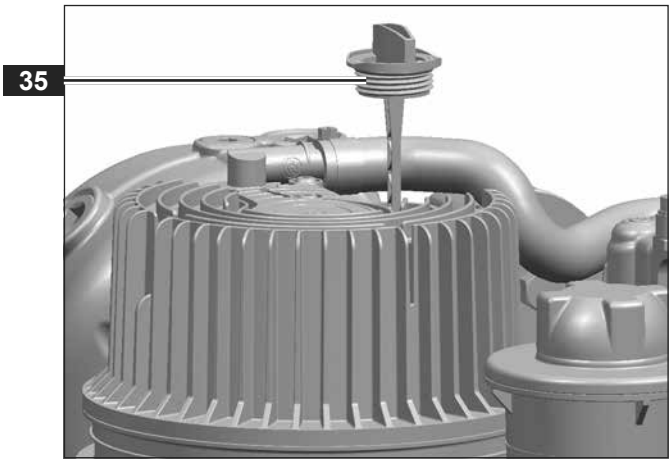
► Check the oil level. (See chapter 4.3.3 Checking oil level.)

► Touch up the paintwork defects.

► Clearing service counter for service light. (See the Weber Diagnostic Tool manual.)

► Update the engine control unit calibration. (See the Weber Diagnostic Tool manual.)

► Test-drive the vehicle.



8.4 Checking sacrificial anode

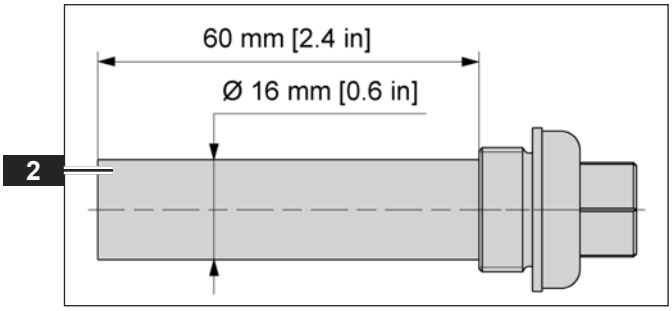
Information! The water jacket in the exhaust manifold is protected from corrosion by a passive cathodic protection.

► Unscrew the sacrificial anode 1.

► Check the sacrificial anode 2.

At least half of the original size 60 mm [2.4 in], Ø 16 mm [0.6 in] exists.

► If the sacrificial anode is less than half of the original size, replace the sacrificial anode.



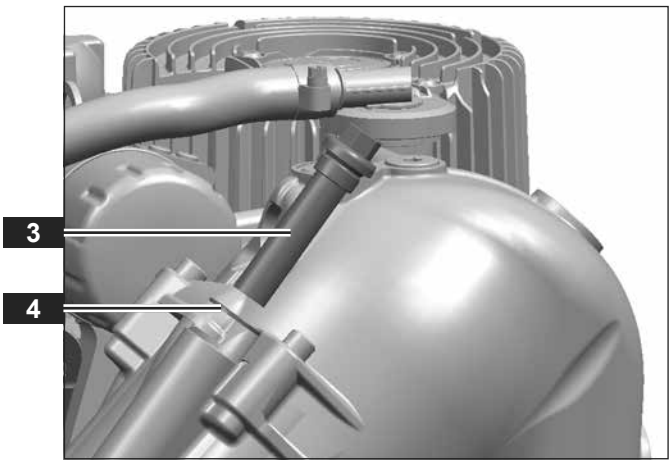
► Replace the seal 4.

► Screw in the sacrificial anode 3.

Tightening torque:

41 Nm +9 Nm [30.2 lbf ft +6.6 lbf ft]

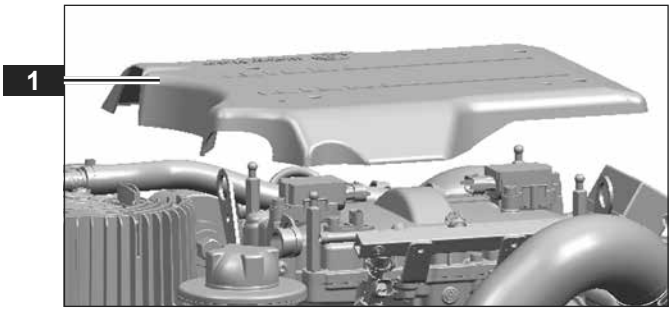
► Touch up the paintwork defects.



8.5 Checking and adjusting valve play

8.5.1 Checking valve play

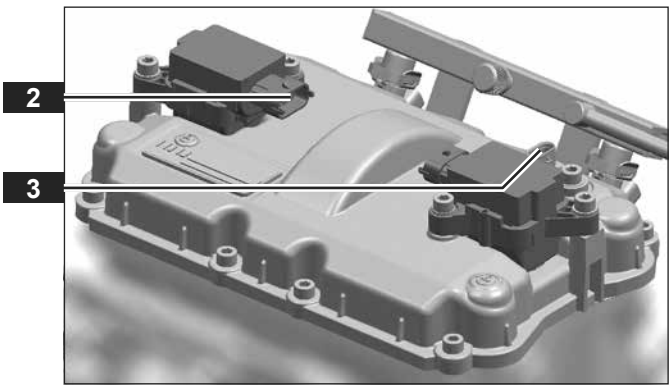
► Remove the engine cover 1.



Check valve play with a cold engine.

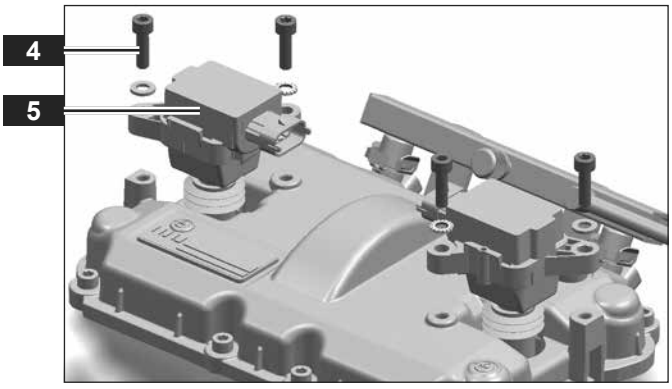
WARNING! Danger of serious cuts from the gear on the camshaft when the engine is started. Disconnect the engine from the power supply.

► Disconnect the wire harness connectors from the ignition coils 2 and sensor camshaft 3.



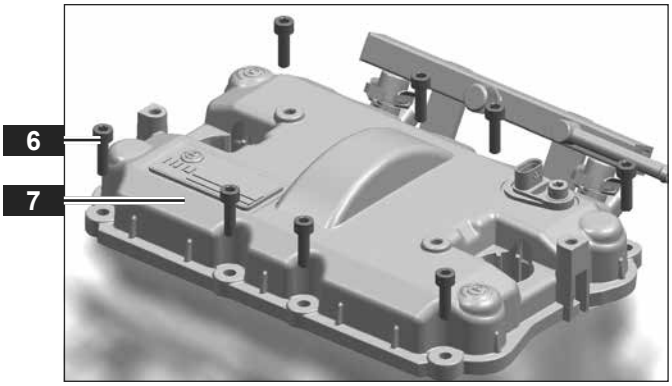
► Unscrew the bolts 4.

► Pull the ignition coils 5 out.



► Unscrew the bolts 6.

► Remove the valve cover 7.



Information! The camshaft is turned using the crankshaft. The vehicle manufacturer has devised a suitable procedure for this. Read the vehicle manufacturer's documentation for more information. Always turn the crankshaft in the same direction as the engine rotates. (See chapter 3.6 Engine components and information.) Two rotations of the crankshaft correspond to one rotation of the camshaft.

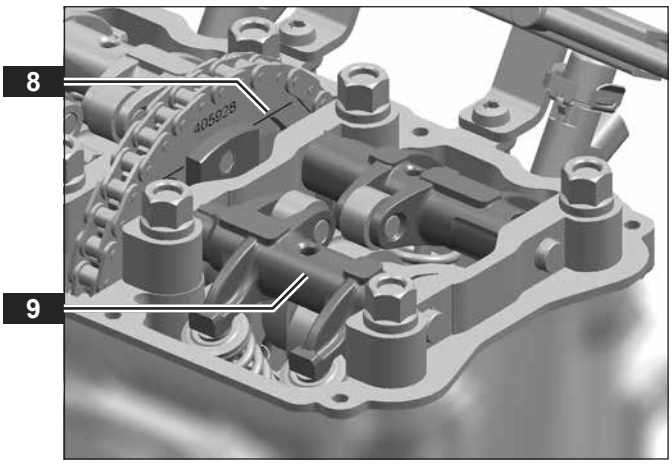
Checking the valve play on the 2nd cylinder

► Turn the camshaft until the position of the camshaft is as illustrated. (See the vehicle manufacturer's documentation.)

The camshaft is marked at the 2nd cylinder end only.

The marking 8 ends flush with the cross bar.

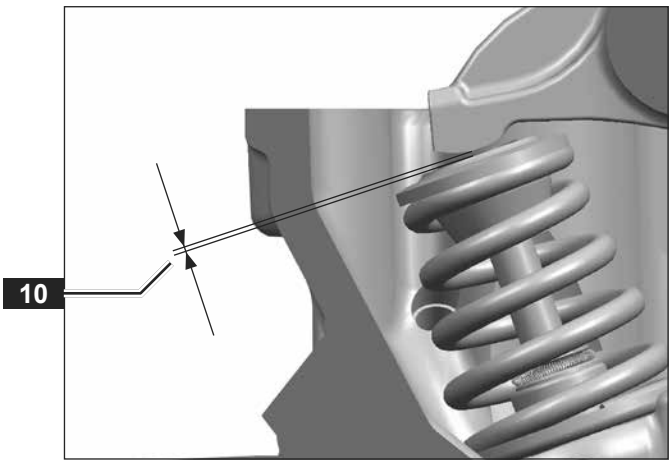
All rocker arms 9 on the cylinder have a certain amount of play.



► Check the valve play 10 of all valves on the cylinder using a feeler gauge.

Required valve play:
0,2 – 0,3 mm

► If the valve play of one or more valves is not right, continue with chapter 8.5.2 **Adjusting valve play**.



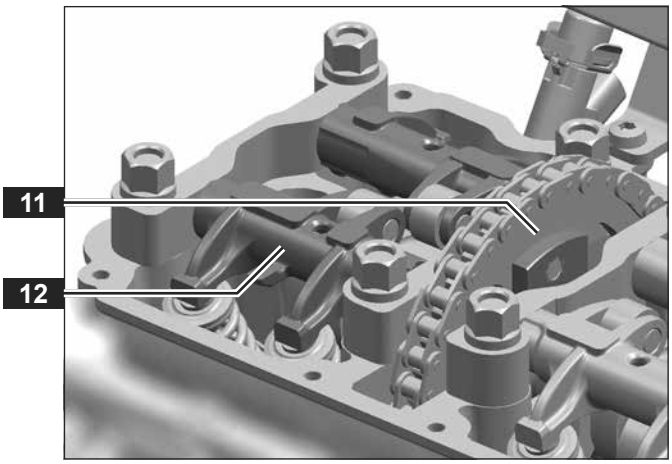
Checking the valve play on the 1st cylinder

► Turn the camshaft until the position of the camshaft is as illustrated. (See the vehicle manufacturer‘s documentation.)

The camshaft is marked at the 2nd cylinder end only.

The inscription **11** is not visible.

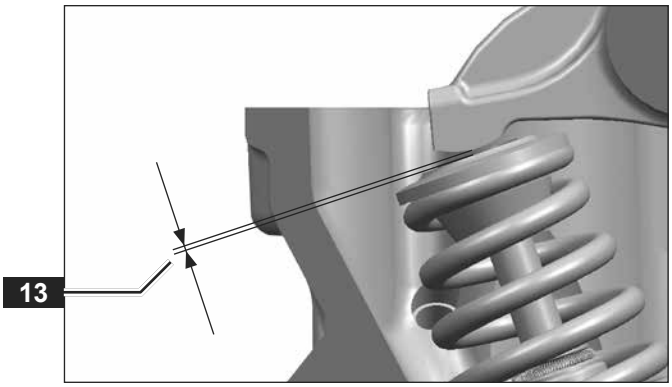
All rocker arms **12** on the cylinder have a certain amount of play.



► Check the valve play **13** of all valves on the cylinder using a feeler gauge.

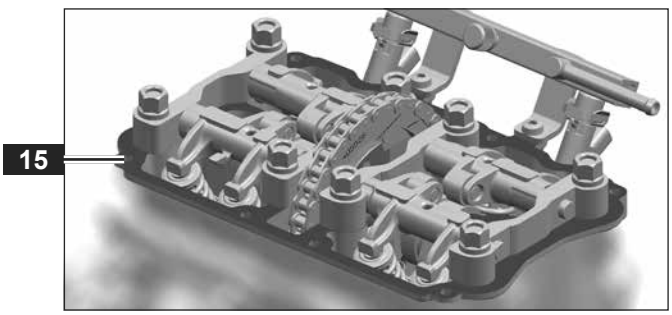
Required valve play:
0,2 – 0,3 mm

► If the valve play of one or more valves is not right, continue with chapter 8.5.2 **Adjusting valve play**.



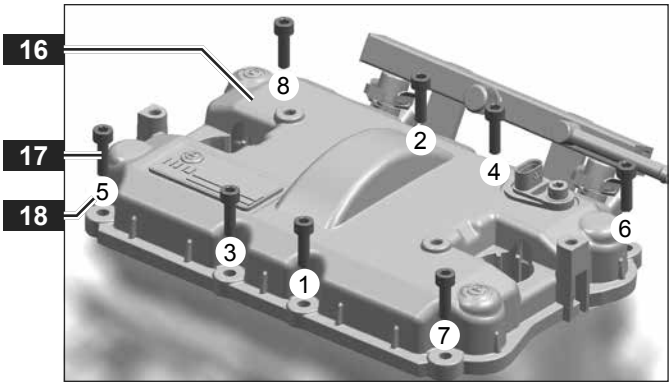
► Replace the valve cover seals **14**.

► Clean the sealing surface **15** with sealing surface cleaner.



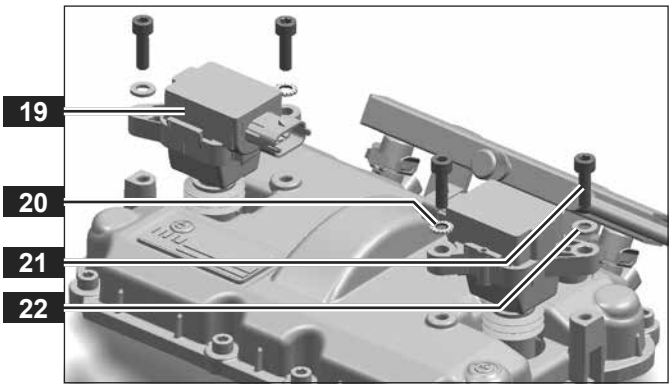
- ► Put the valve cover 16 on.
- ► Apply Anti-Seize assembly paste to all bolts 17.
- ► Screw in the bolts in the sequence as illustrated 18.

Tightening torque:
8 Nm +2 Nm [5.9 lbf ft +1.5 lbf ft]

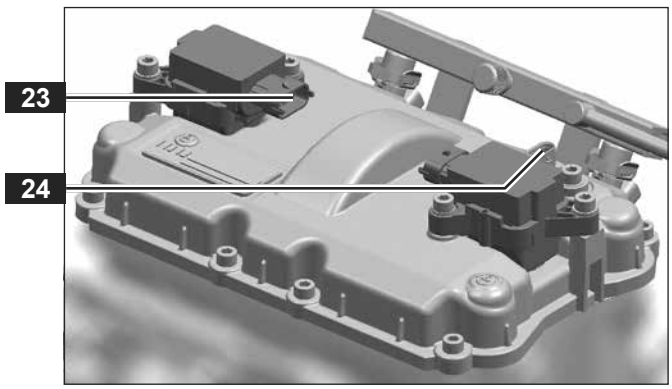


- ► Insert the ignition coils 19.
- ► Replace the serrated lock washers 20. Assemble the bolts 21, washers 22 and serrated lock washers as illustrated.

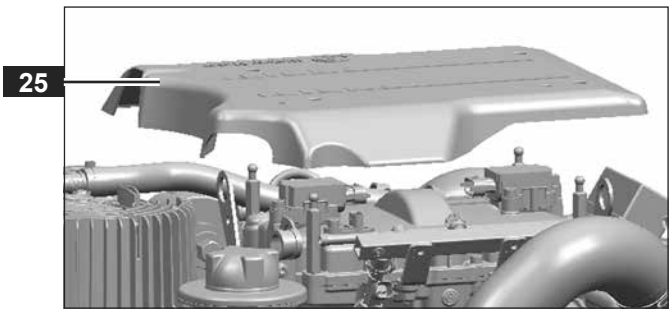
Tightening torque:
8 Nm +2 Nm [5.9 lbf ft +1.5 lbf ft]



- ► Connect the wire harness connectors to the ignition coils 23 and sensor camshaft 24.
- ► Touch up the paintwork defects.
- ► Clear the service counter to reset service light. (See the Weber Diagnostic Tool manual.)
- ► Update the engine control unit calibration. (See the Weber Diagnostic Tool manual.)



- ► Place the engine cover 25 and press down the engine cover until it is snapped.
- ► Test-drive the vehicle.



8.5.2 Adjusting valve play

Information! The camshaft is turned using the crankshaft. The vehicle manufacturer has devised a suitable procedure for this. Read the vehicle manufacturer‘s documentation for more information. Always turn the crankshaft in the same direction as the engine rotates. (See chapter 3.6 Engine components and information.) Two rotations of the crankshaft correspond to one rotation of the camshaft.

Adjusting valve play on the 2nd cylinder

WARNING! Danger of serious cuts from the gear on the camshaft when the engine is started. Disconnect the engine from the power supply.

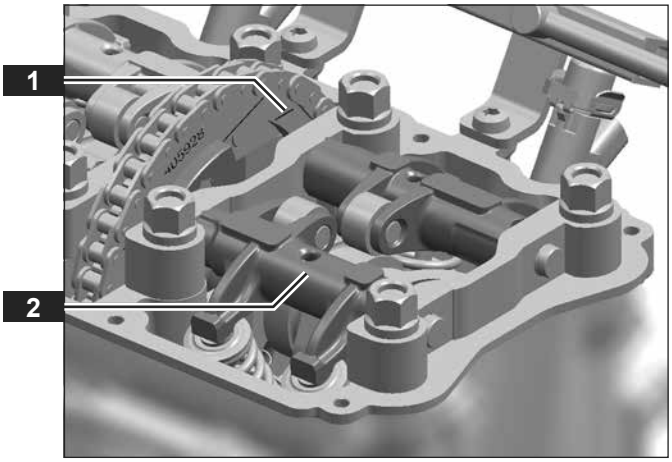
► Turn the camshaft until the position of the camshaft is as illustrated. (See the vehicle manufacturer‘s documentation.)

The camshaft is marked at the 2nd cylinder end only.

The marking 1 ends flush with the cross bar.

All rocker arms 2 on the cylinder have a certain amount of play.

► Continue with the section **Replacing valve adjustment shim**.



Adjusting valve play on the 1st cylinder

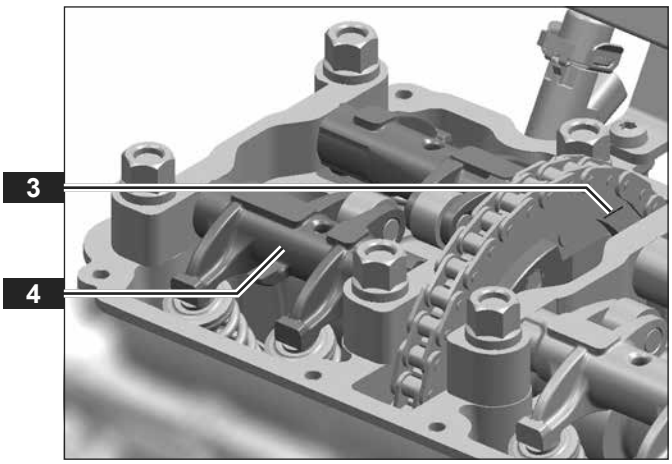
► Turn the camshaft until the position of the camshaft is as illustrated. (See the vehicle manufacturer‘s documentation.)

The camshaft is marked at the 2nd cylinder end only.

The marking 3 ends flush with the cross bar. Otherwise, no inscription is visible.

All rocker arms 4 on the cylinder have a certain amount of play.

► Continue with the section **Replacing valve adjustment shim**.



Replacing valve adjustment shim

NOTICE! Engine damage from small components in the engine or cylinder head. Operating the engine when there are small components in the crankcase and cylinder head can result in serious damage and cause the crank drive to seize.

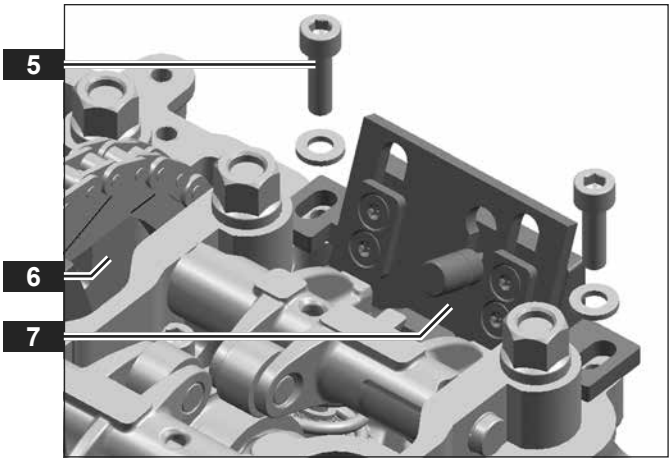
► Cover the chain channel 6.

► Hold the valve adjustment tool 7 in position.

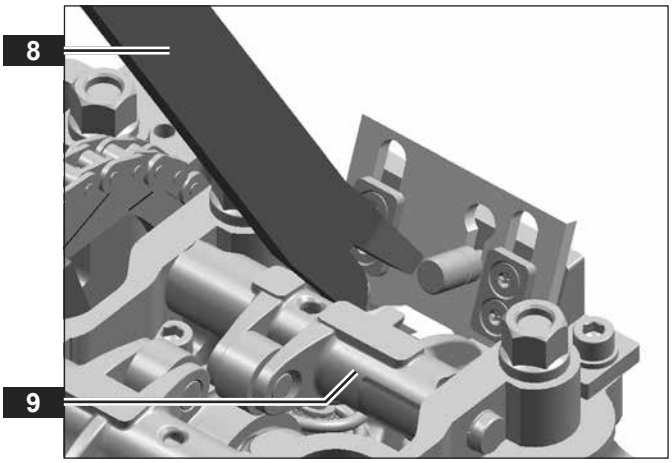
► Screw in the bolts 5.

Tightening torque:

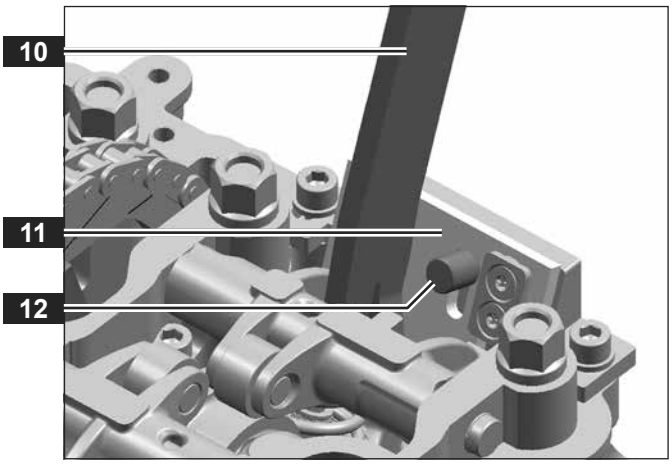
8 Nm +2 Nm [5.9 lbf ft +1.5 lbf ft]



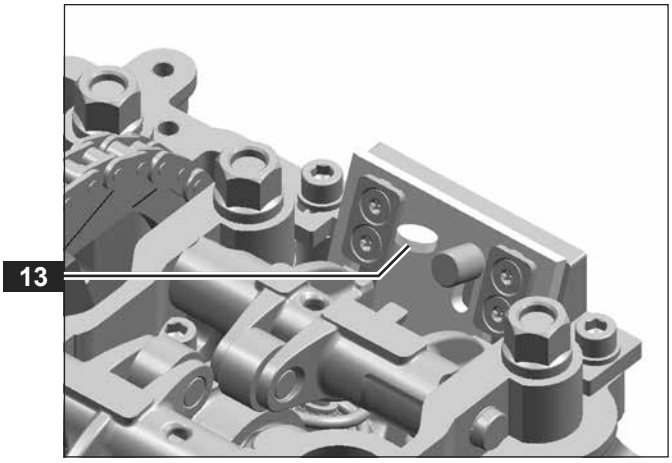
► Position the rocker arm pusher 8 on the rocker arm 9.



► Press down the slide plate 11 using the rocker arm pusher 10 until the pin 12 engages.

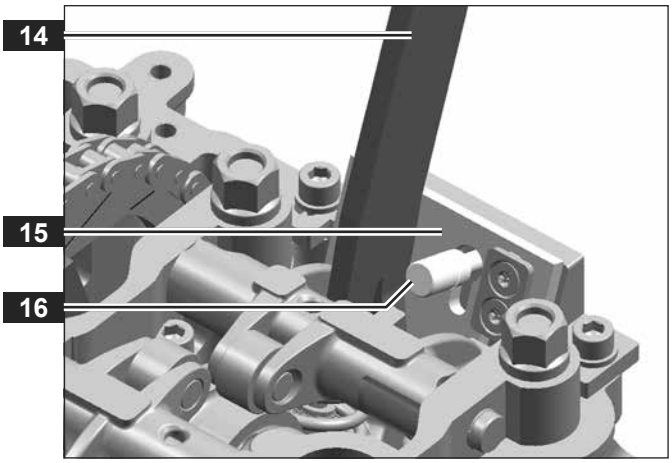


- ► Remove the valve adjustment shim **13** using a bar magnet.
- ► Measure the valve adjustment shim using a caliper.
- ► Insert the new valve adjustment shim.



- ► Hold the rocker arm pusher **14** in position.
- ► Press down the slide plate **15** slightly using the rocker arm pusher.
- ► Slide the pin **16** forward by hand.
- ► Slowly release the rocker arm pusher.

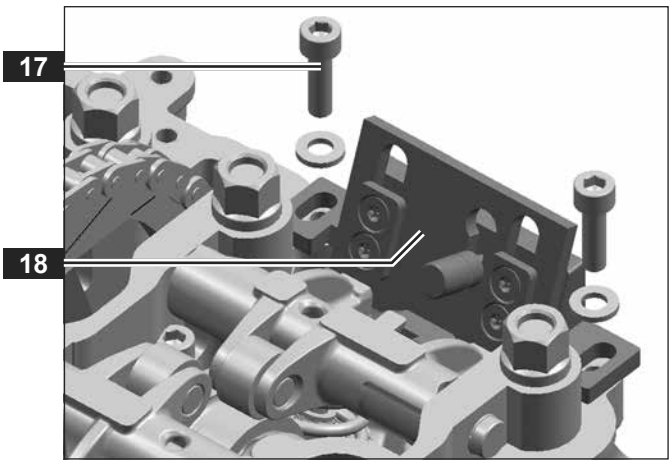
  The valve spring slides the slide plate upwards again.



- ► Unscrew the bolts **17**.
- ► Remove the valve adjustment tool **18**.
- ► Remove the cover from the chain channel.

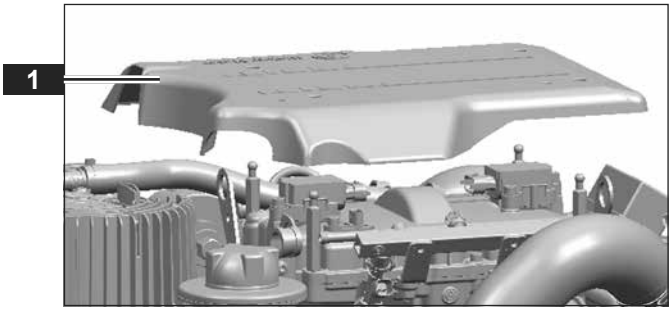
NOTICE! Valve breakage due to insufficient valve play.

- ► Check the valve play.
- ► Continue with chapter 8.5.1 **Checking valve play**.



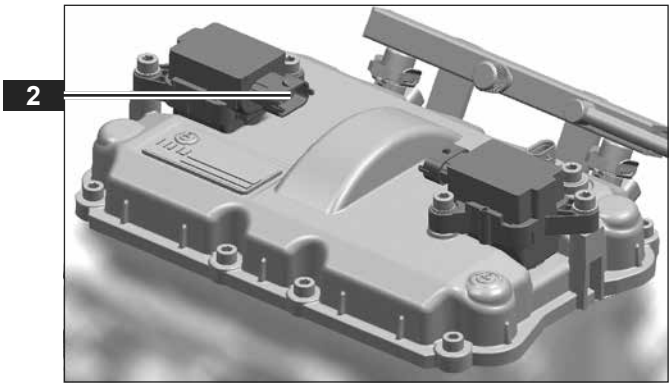
8.6 Replacing spark plugs and igition coils

► Remove the engine cover 1.



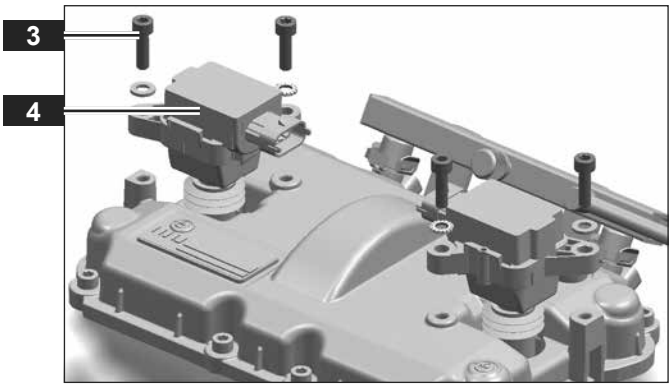
Remove the spark plugs with a cold engine.

► Disconnect the wire harness connectors from the ignition coils 2.



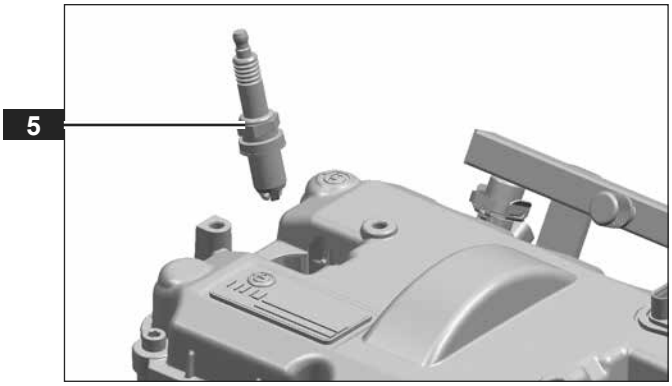
► Unscrew the bolts 3.

► Pull the ignition coils 4 out.



- ► Unscrew the spark plugs 5 using a spark plug wrench.
- ► Replace the spark plugs.
- ► Screw in the spark plugs using a spark plug wrench.

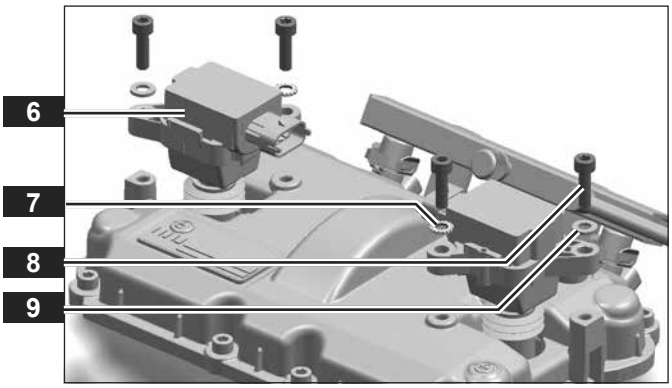
Tightening torque:
22 Nm +10 Nm [16.2 lbf ft +7.4 lbf ft]



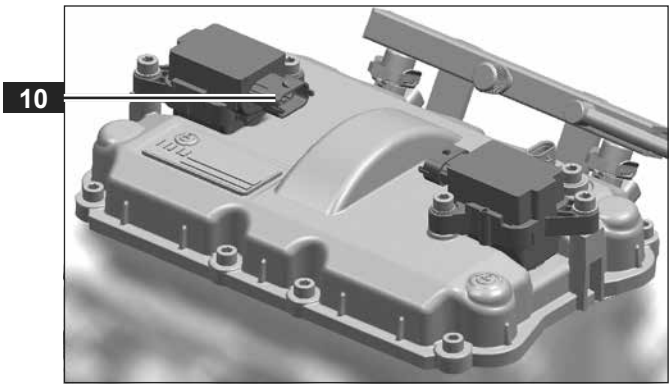
The ignition coils must not be replaced always. (See chapter 4.1 Service intervals.)

- ► Replace the ignition coils 6.
- ► Insert the ignition coils.
- ► Replace the serrated lock washers 7. Assemble the bolts 8, washers 9 and serrated lock washers as illustrated.

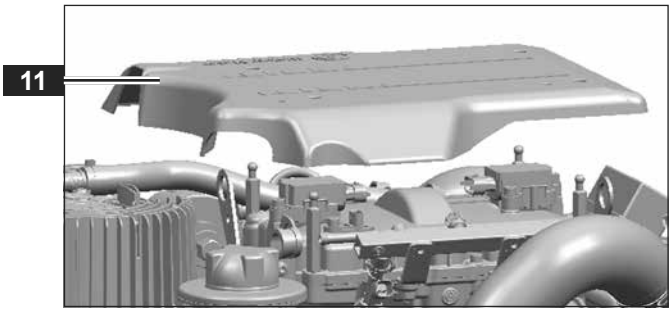
Tightening torque:
8 Nm +2 Nm [5.9 lbf ft +1.5 lbf ft]



- ► Connect the wire harness connectors to the ignition coils 10.
- ► Touch up the paintwork defects.
- ► Clear the service counter to reset service light. (See the Weber Diagnostic Tool manual.)
- ► Update the engine control unit calibration. (See the Weber Diagnostic Tool manual.)

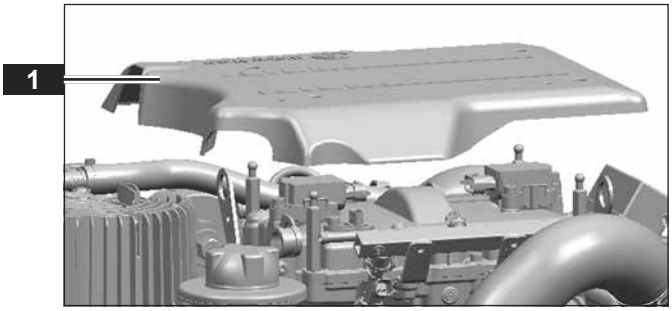


- ► Place the engine cover 11 and press down the engine cover until it is snapped.
- ► Test-drive the vehicle.



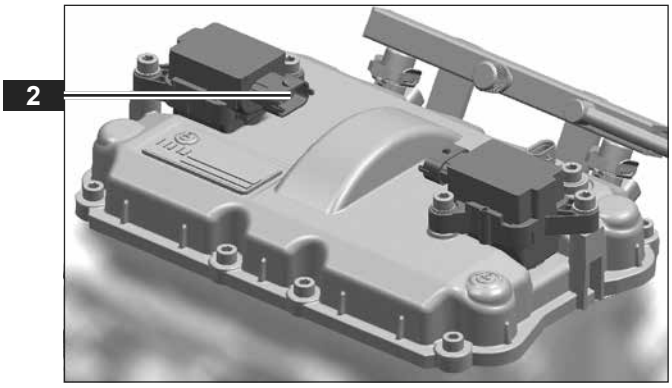
8.7 Checking spark plugs

► Remove the engine cover 1.



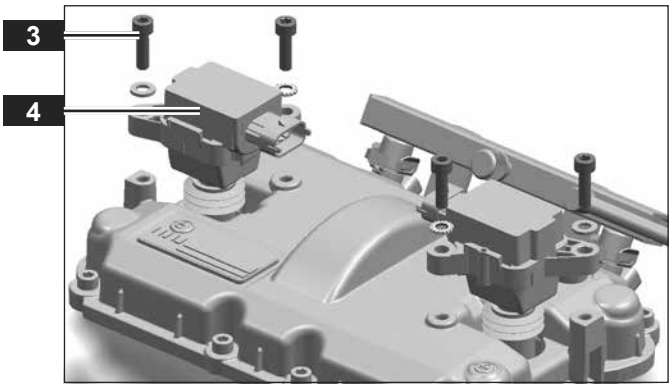
Remove the spark plugs with a cold engine.

► Disconnect the wire harness connectors from the ignition coils 2.

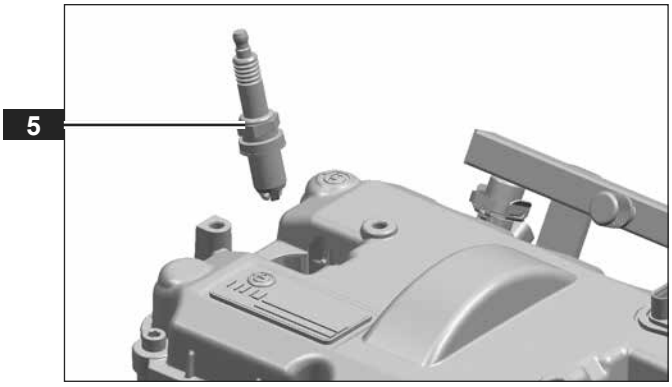


► Unscrew the bolts 3.

► Pull the ignition coils 4 out.



► Unscrew the spark plugs 5 using a spark plug wrench.

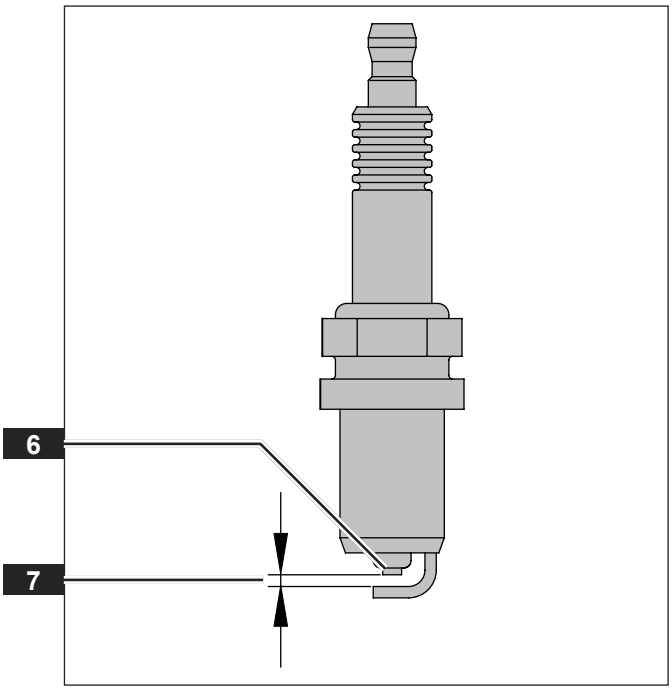


► If the electrodes 6 are extremely sooty, clean carefully using a spark plug brush.

► Check the spark plug gap 7 using a feeler gauge.

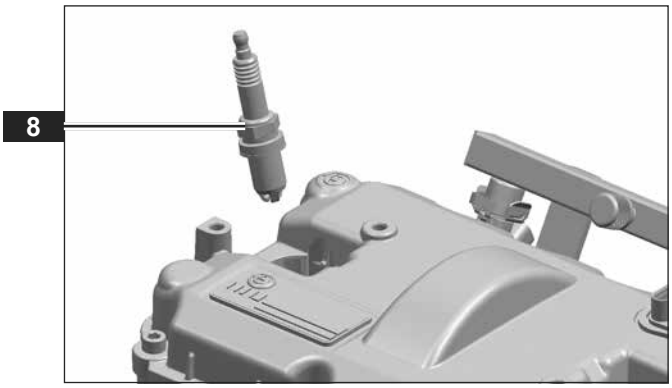
Required spark plug gap:
0,69 – 0,84 mm [0.028 – 0.032 in]

► If the spark plug gap is not satisfactory, replace the spark plug. Always replace the spark plugs in pairs.



► Screw in the spark plugs 8 using a spark plug wrench.

Tightening torque:
22 Nm +10 Nm [16.2 lbf ft +7.4 lbf ft]

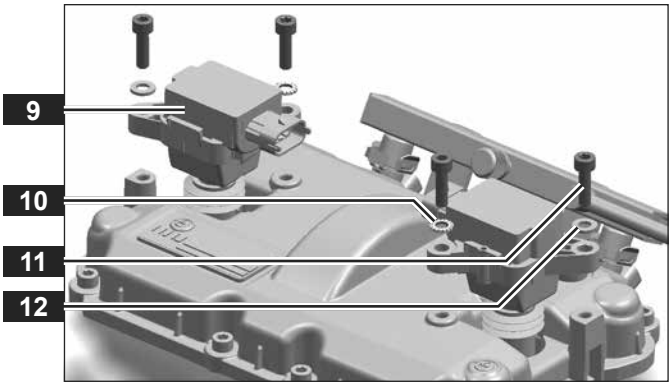


► Insert the ignition coils 9.

► Replace the serrated lock washers 10. Assemble the bolts 11, washers 12 and serrated lock washers as illustrated.

Tightening torque:

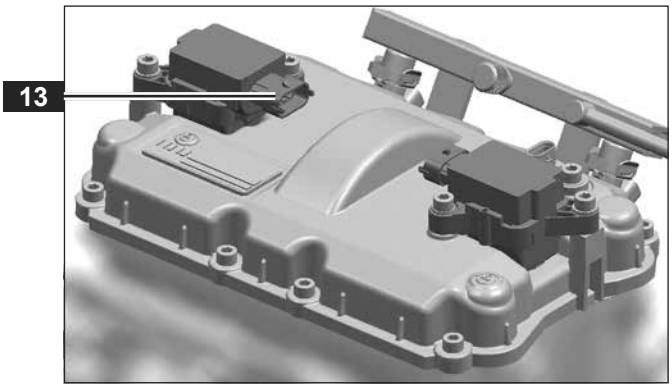
8 Nm +2 Nm [5.9 lbf ft +1.5 lbf ft]



► Connect the wire harness connectors to the ignition coils 13.

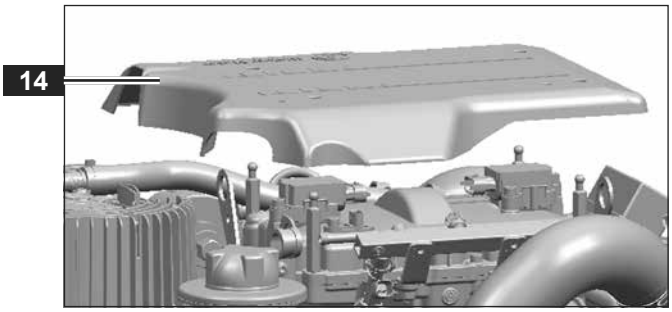
► Touch up the paintwork defects.

► Test-drive the vehicle.



► Place the engine cover 14 and press down the engine cover until it is snapped.

► Test-drive the vehicle.

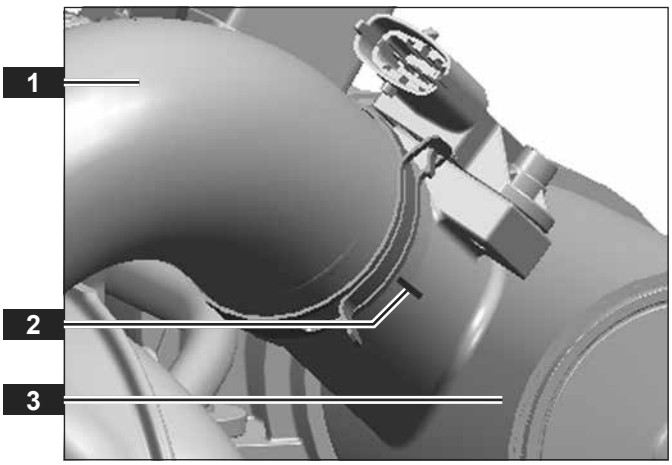


8.8 Replacing rubber mount

Engine variants
I2 846 MAR TC-80, TC-100 and TC-120

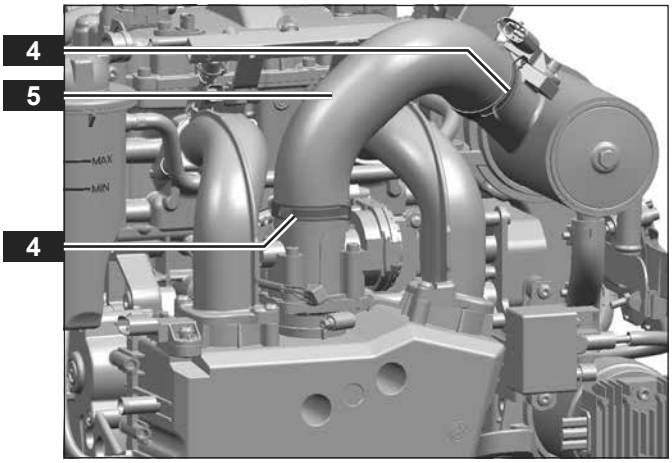
Remove the rubber mount with a cold engine.

► Mark 2 the hose 1 and intercooler 3.



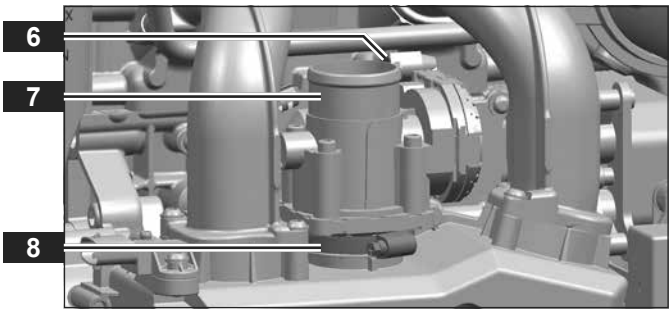
► Open the spring band clamps 4.

► Remove the hose 5.

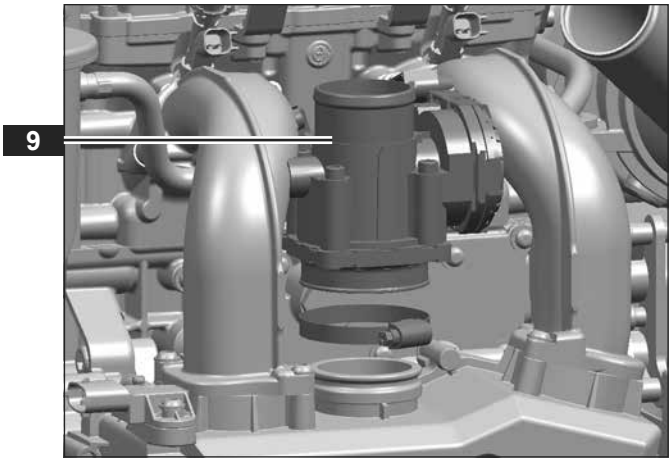


► Disconnect the wire harness connector 6 from the throttle body 7.

► Open the hose clamp 8.

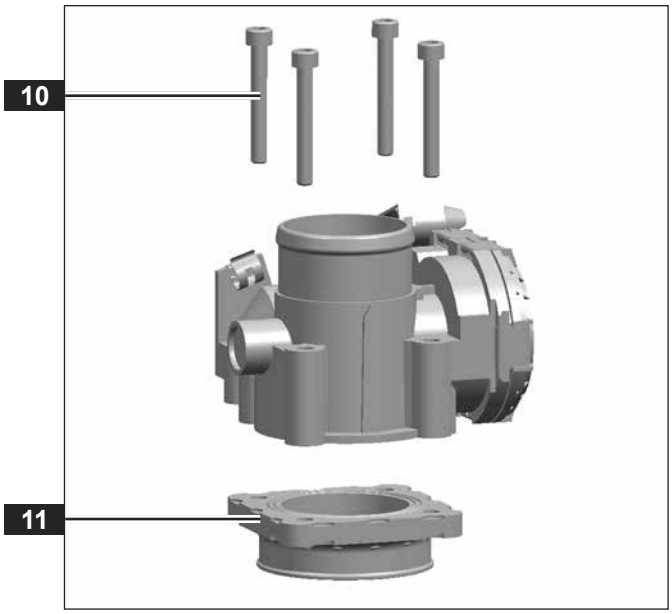


► Remove the throttle body 9.

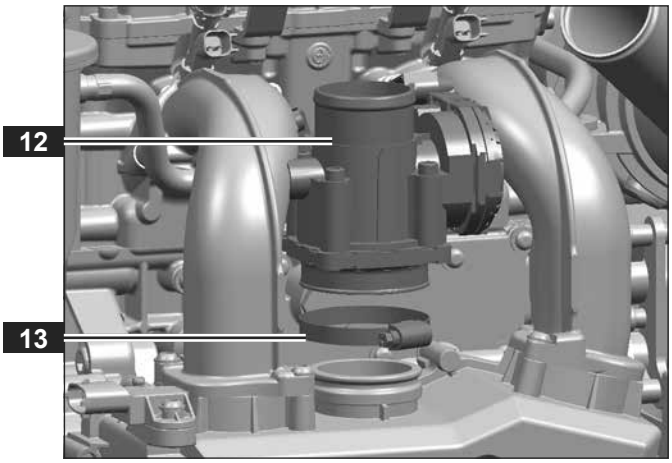


► Unscrew the bolts 10.
► Remove the rubber mount 11.
► Replace the rubber mount.
► Hold the rubber mount in position.
► Screw in the bolts.

Tightening torque:
8 Nm +2 Nm [5.9 lbf ft +1.5 lbf ft]



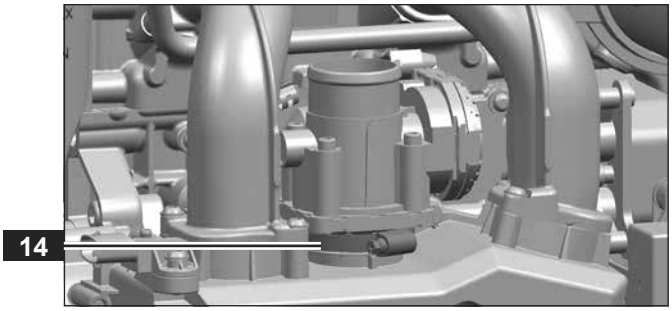
► Insert the hose clamp 13 and throttle body 12.



► Close the hose clamp 14.

Tightening torque:

3 Nm +0,5 Nm [2.2 lbf ft +0.4 lbf ft]



► Insert the hose 16.

Observe the marking.

► Close the spring band clamps 15.

► Touch up the paintwork defects.

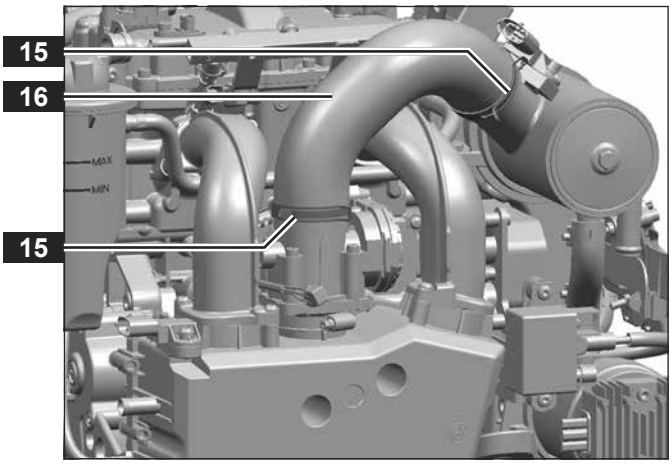
► Clear the service counter to reset service light. (See the Weber Diagnostic Tool manual.)

► Update the engine control unit calibration. (See the Weber Diagnostic Tool manual.)

► Switch on the ignition for a minute.

The throttle body is calibrated.

► Test-drive the vehicle.

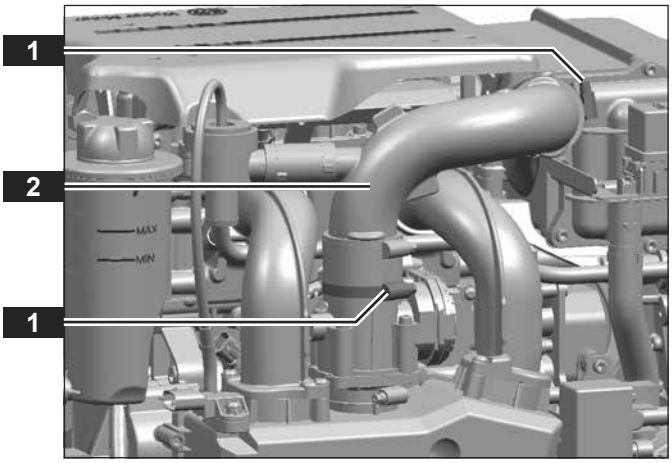


Engine variant I2 846 MAR TC-155

Remove the rubber mount with a cold engine.

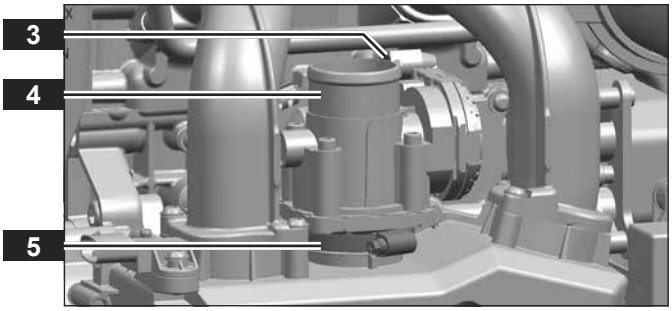
► Open the hose clamps 1.

► Remove the connecting pipe 2.

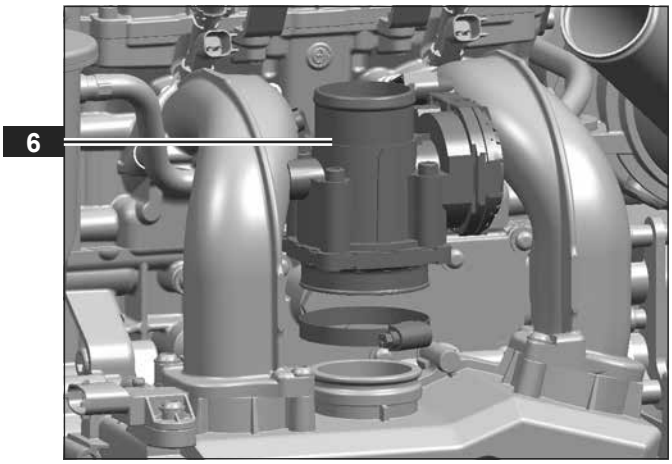


► Disconnect the wire harness connector 3 from the throttle body 4.

► Open the hose clamp 5.



► Remove the throttle body 6.



► Unscrew the bolts 7.

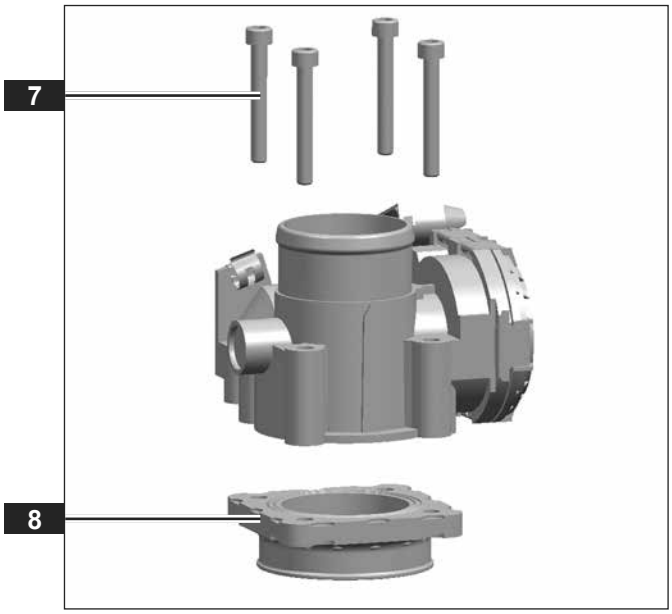
► Remove the rubber mount 8.

► Replace the rubber mount.

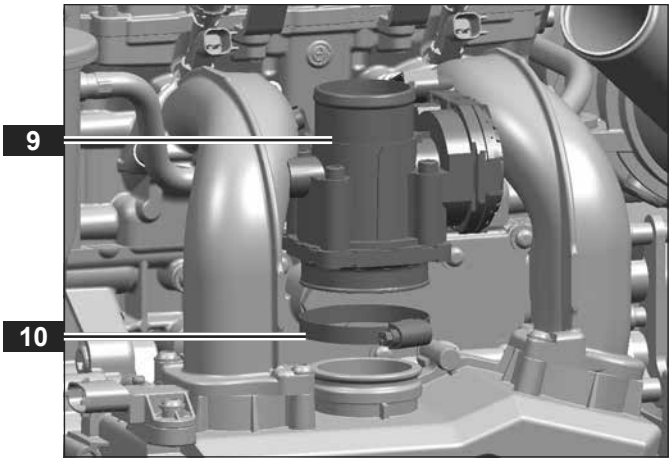
► Hold the rubber mount in position.

► Screw in the bolts.

Tightening torque:
8 Nm +2 Nm [5.9 lbf ft +1.5 lbf ft]

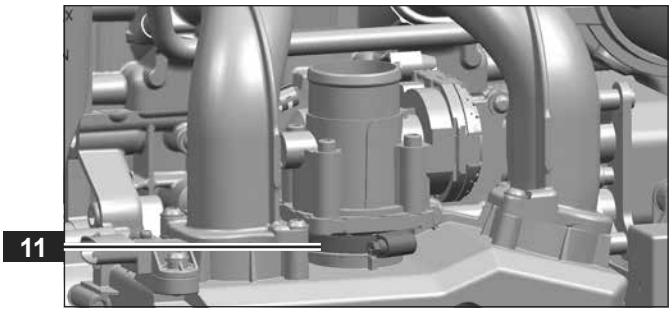


► Insert the hose clamp 10 and throttle body 9.



► Close the hose clamp 11.

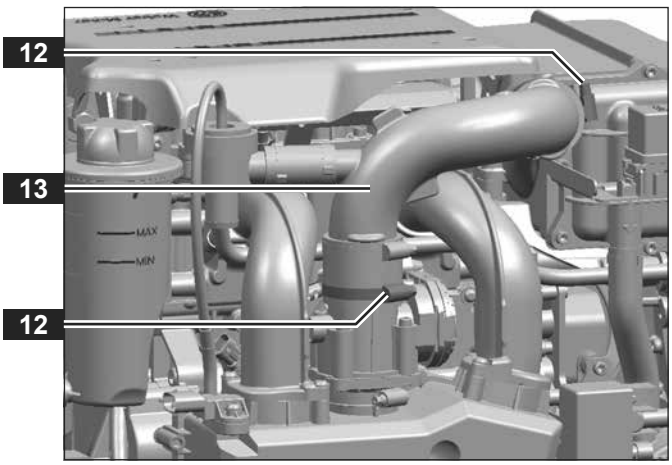
Tightening torque:
3 Nm +0,5 Nm [2.2 lbf ft +0.4 lbf ft]



► Hold the the connecting pipe 13 in position.

► Close the hose clamps 12.

Tightening torque:
3 Nm +0,5 Nm [2.2 lbf ft +0.4 lbf ft]



► Touch up the paintwork defects.

► Clear the service counter to reset service light. (See the Weber Diagnostic Tool manual.)

► Update the engine control unit calibration. (See the Weber Diagnostic Tool manual.)

► Switch on the ignition for a minute.

The throttle body is calibrated.

► Test-drive the vehicle.

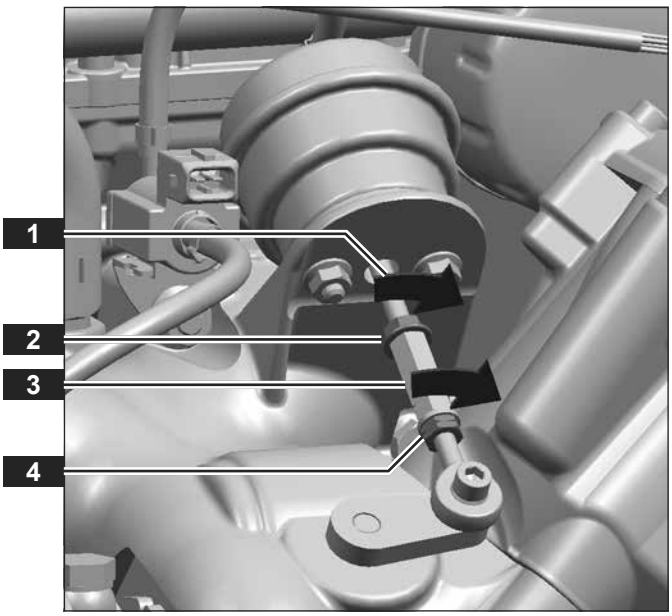
8.9 Adjusting waste gate valve

Adjust the waste gate valve with a cold engine.

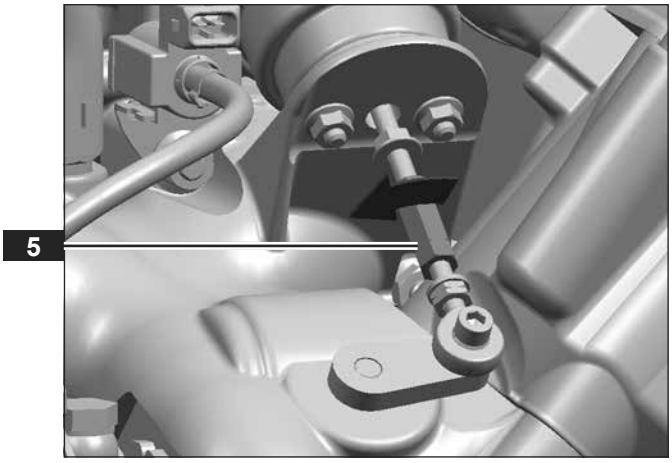
Observe the indicated directions of rotation 1. One nut 4 has a left-hand thread.

► Hold the threaded rod 3 with a wrench.

► Open the two nuts 2 4 in direction of rotating.



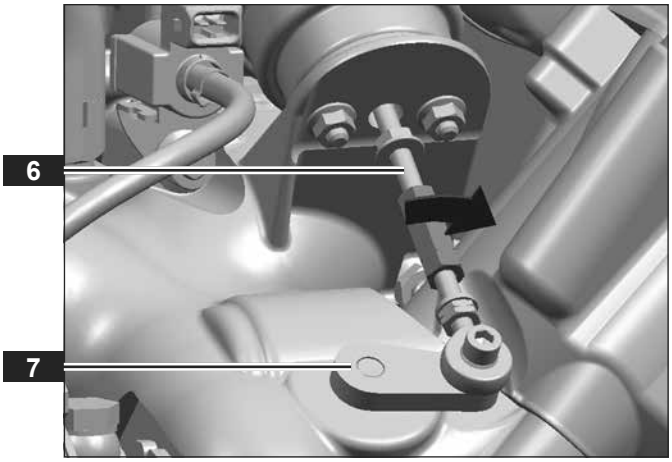
► Open the spanner nut 5 in the indicated direction of rotation until no longer pretensioning exists



► Close the spanner nut in the indicated direction of rotation until the following conditions are met.

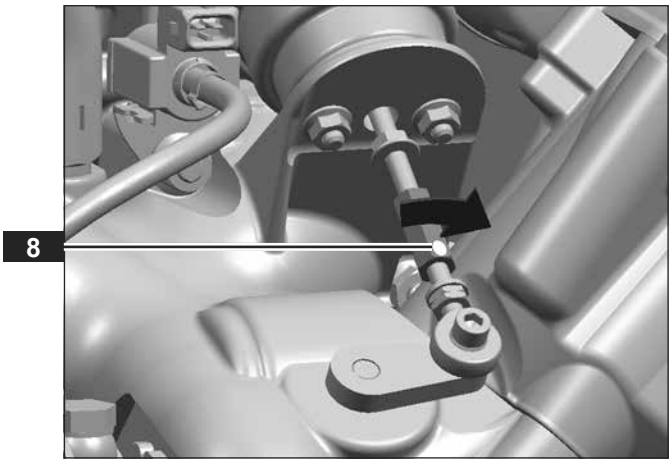
The lever 7 does not move anymore.

The thread rod 6 has not moved yet.



► Attach the marking 8.

► Close the spanner nut with two full turns in the indicated direction of rotation.



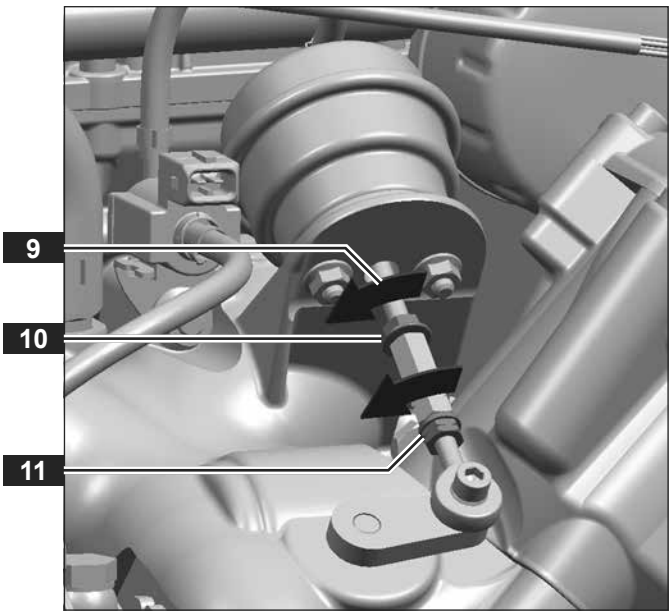
► Close the two nuts 10 11 in direction of rotation 9 .

► Touch up the paintwork defects.

► Clear the service counter to reset service light. (See the Weber Diagnostic Tool manual.)

► Update the engine control unit calibration. (See the Weber Diagnostic Tool manual.)

► Test-drive the vehicle.

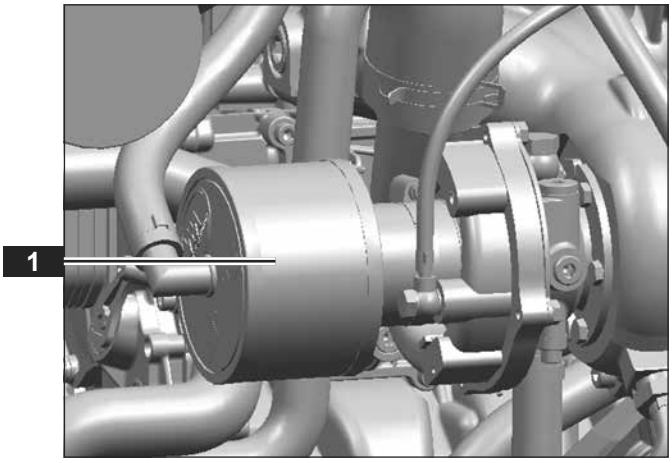


8.10 Checking flame arrester

► Check the flame arrester 1.

The fabric must be visible.

► When the fabric filter is no longer visible, continue with section **Cleaning the flame arrestor**.

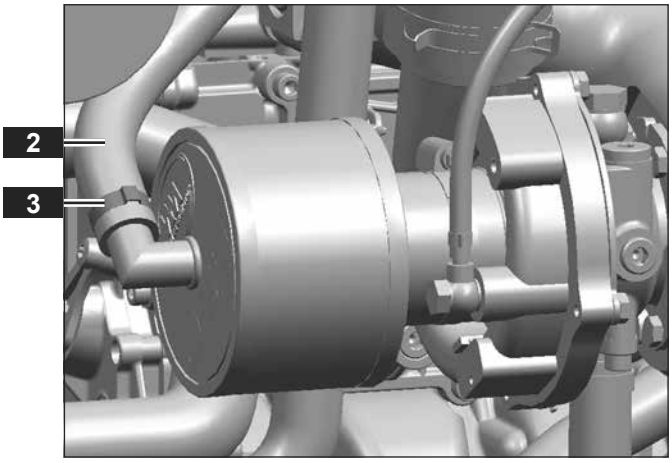


Cleaning flame arrester

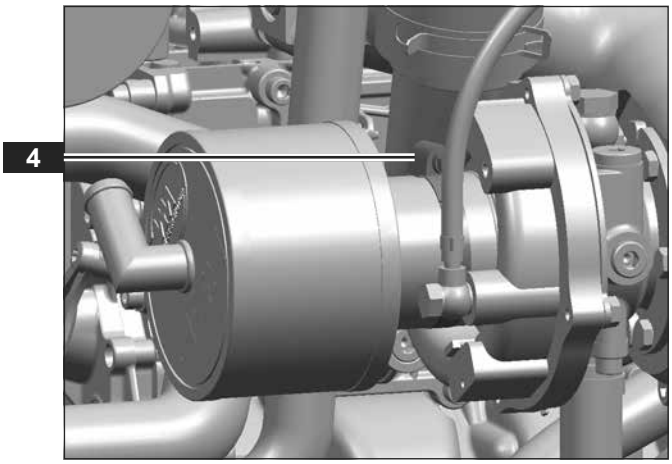
► Open the clamp 3.

The clamp built in by the engine manufacturer in these place is destroyed during removal. After removing the clamp must be replaced by an hose clamp.

► Remove the hose 2.



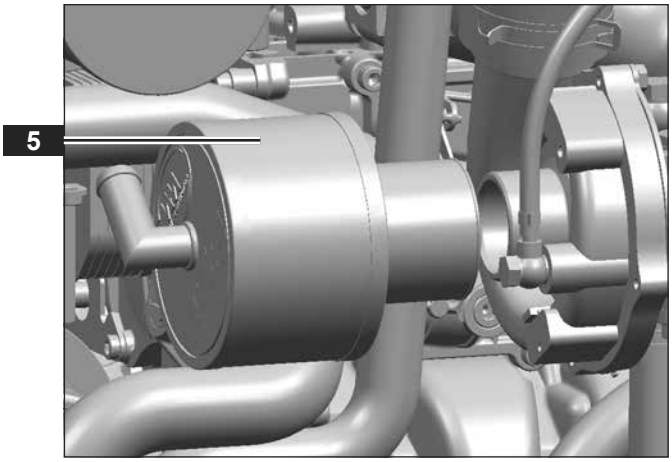
► Open the hose clamp 4.



► Remove the flame arrester 5.

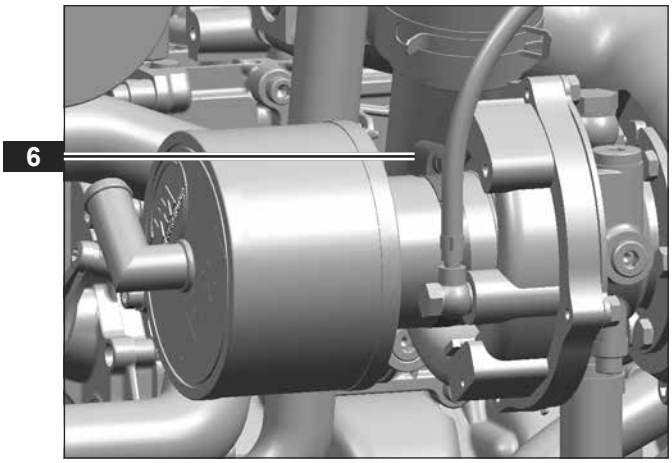
► Clean the flame arrester with cleaning spray according to the manufacturer's instructions.

► Attach the flame arrester.



► Close the hose clamp 6.

Tightening torque:
4,5 Nm +1 Nm [3.3 lbf ft +0.7 lbf ft]

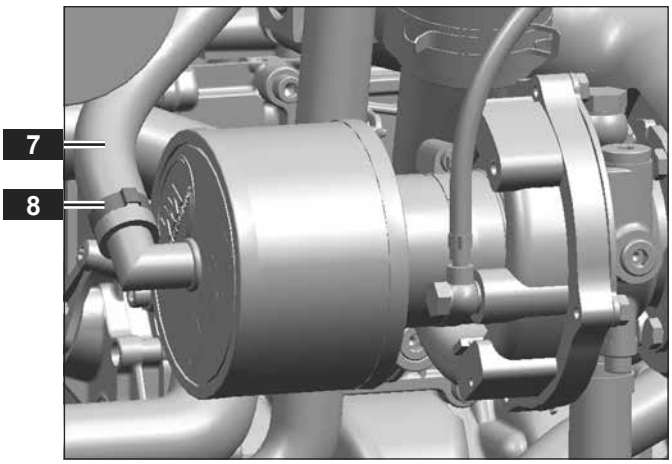


► Replace the clamp 8.

► Insert the hose 7.

► Close the hose clamp.

Tightening torque:
3 Nm +0,5 Nm [2.2 lbf ft +0.4 lbf ft]



8.11 Changing coolant

Drain the coolant with a cold engine.

► Unscrew the expansion tank cover 1.

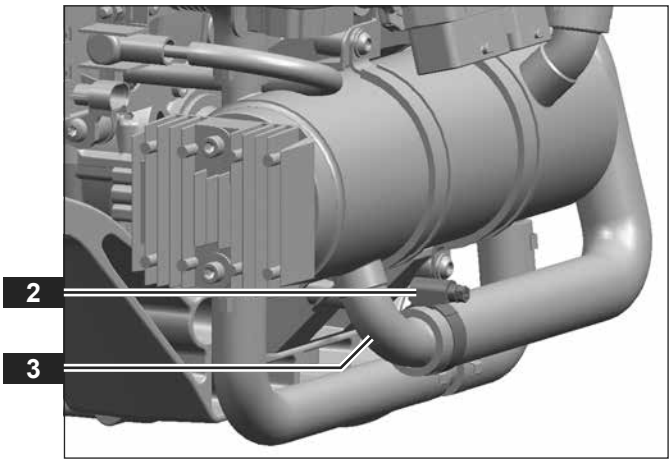
Draining coolant

► Put the drain tray under the fitting 3 on heat exchanger.

► Open the hose clamp 2.

► Remove the hose and keep it over the drain tray.

Coolant drains off.



Flushing coolant circuit

► Fill the expansion tank 4 with clean fresh water.

Water drains off through the heat exchanger.

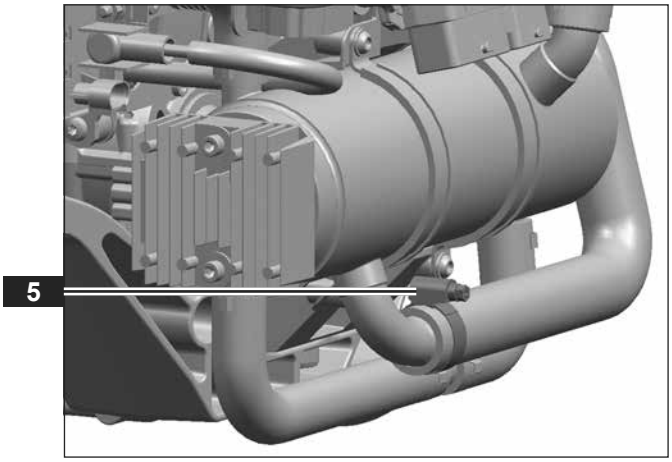
► Repeat the procedure until only clear water drains off through the heat exchanger.

► Insert the hose.

► Close the hose clamp 5.

Tightening torque:

5 Nm +0,5 Nm [3.7 lbf ft +0.4 lbf ft]



Filling with coolant

- ► Fill coolant to the expansion tank until the MAX-marking 6.
- ► Close the expansion tank.
- ► Warm up the engine. (See the vehicle manufacturer‘s documentation.)
- ► Check the coolant level.

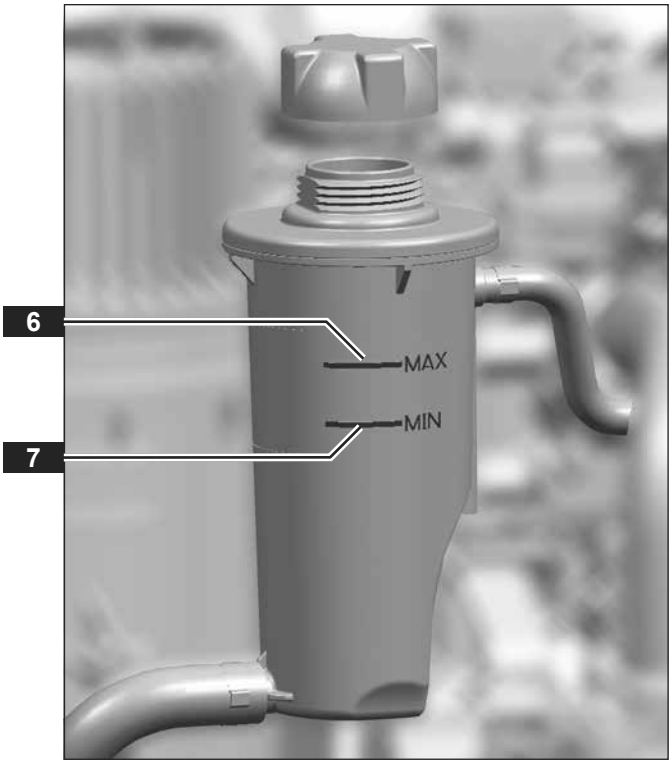
CAUTION! Scalding caused by hot steam. Open expansion tank only with a cold engine.

NOTICE! Danger of overheating caused by a lack of coolant.

- ► When coolant level is below the MIN-marking 7, wait until the engine has cooled down.
- ► Refill coolant, until the coolant level is between the MIN-marking and the MAX-marking.

NOTICE! Leaks in the hoses due to increased pressure.

- ► When the MAX-marking is exceeded, pump out excessive coolant with a suction pump.
- ► Touch up the paintwork defects.
- ► Clear the service counter to reset service light. (See the Weber Diagnostic Tool manual.)
- ► Update the engine control unit calibration. (See the Weber Diagnostic Tool manual.)
- ► Test-drive the vehicle.



8.12 Replacing fuel filter

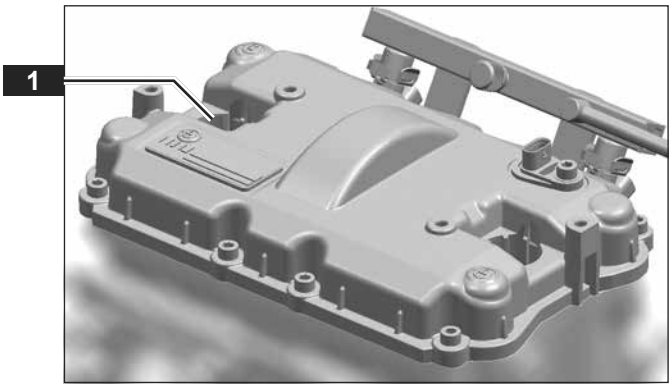
See the vehicle manufacturer‘s documentation.

8.13 Storing engine and putting into operation

8.13.1 Preparing engine for storage

- ► Change the engine oil and oil filter. (See chapter 8.3 Changing engine oil and oil filter.)
- ► Flush the sea water cooling circuit using cleansing concentrate. (See chapter 4.4.1 Flushing sea water cooling circuit.)
- ► Check the sacrificial anode. (See chapter 8.4 Checking sacrificial anode.)
- ► Fill up the fuel tank. Add a fuel stabilizer according to the manufacturer's instructions.

- ► Check the spark plugs. (See chapter 8.7 Checking spark plugs.)
- ► Spray engine internal preservative into the cylinder through the spark plug bores **1** according to the manufacturer's instructions.

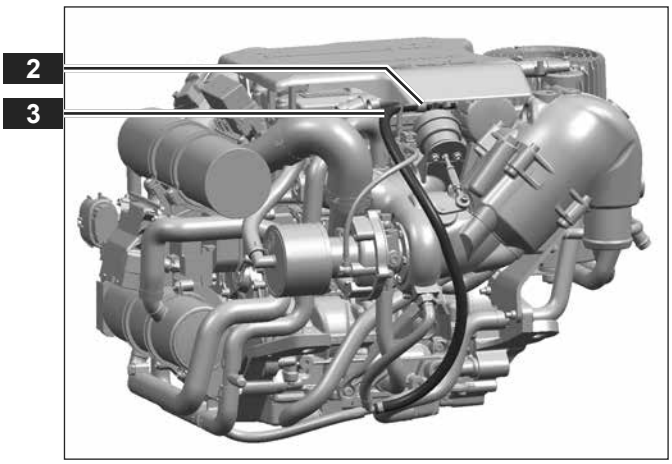


Do not start the engine again.

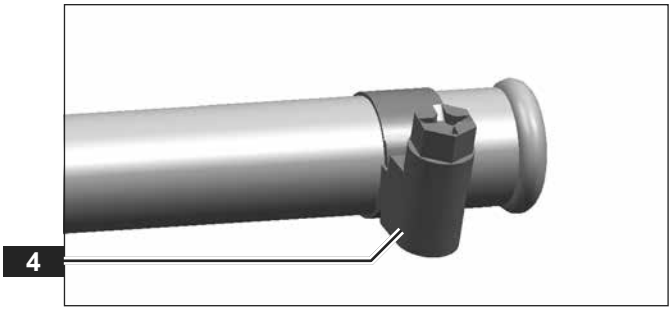
- ► Perform a visual inspection. (See chapter 4.3.1 Inspecting the exhaust and fuel system.)
- ► Apply corrosion protection according to the manufacturer's instructions.

NOTICE! Corrosion damage due to stagnant sea water inside the sea water cooling circuit. If the sea water does not circulate for a long period of time, corrosion can appear in sea water cooling circuit. The open drainage hose at the lowest point of the engine compartment allows sea water to drain off.

- ► Pull out the drainage hose **3** from the hose clip **2**.

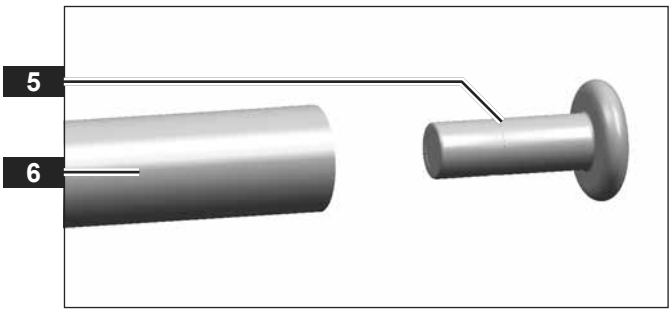


► Open the hose clamp 4.



► Remove the plug 5.

► Place the hose 6 at the lowest point of the engine compartment.



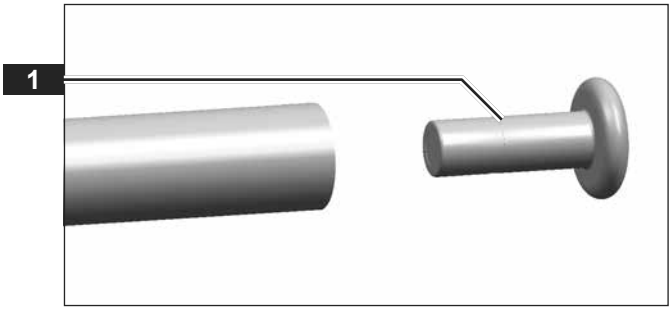
Do not start the engine again.

NOTICE! Water inside the engine due to open drainage hose.

► Inform the user of the vehicle about the measures before the next drive. (See chapter 8.13.2 Putting engine into operation after storage.)

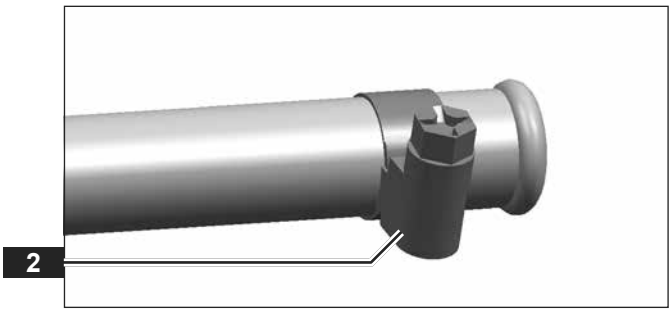
8.13.2 Putting engine into operation after storage

► Insert the plug 1.



► Close the hose clamp 2.

Tightening torque:
3 Nm +0,5 Nm [2.2 lbf ft +0.4 lbf ft]

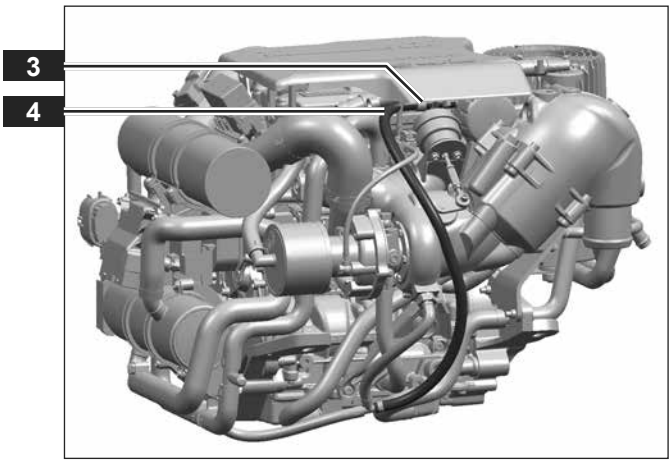


► Mount the drainage hose 4 on the hose clip 3.

► Turn on the ignition, wait a moment and then turn the ignition off.

► Repeat the procedure twice.

The fuel system is filled.



8.14 Disposal

When disposing of operating materials, replaced parts or the whole engine, always comply with the relevant applicable national laws and guidelines.

Weber Motor

9 Confirmation of service tasks

Have the workshop personnel provide certification confirming that your engine was serviced. You can use the following documents.

Engine variant (6-digit) _____ Date of initial registration _____

Serial number (10-digit) _____

Date: Status hours of operation: Company seal, signature	**Work carried out:** ☐ Engine oil and oil filter changed ☐ Sacrificial anode checked ☐ Valve play checked ☐ Spark plugs replaced ☐ Rubber mount replaced ☐ Waste gate valve adjusted ☐ Flame arrester checked ☐ Coolant changed ☐ Fuel filter replaced ....

Date: Status hours of operation: Company seal, signature	**Work carried out:** ☐ Engine oil and oil filter changed ☐ Sacrificial anode checked ☐ Valve play checked ☐ Spark plugs replaced ☐ Rubber mount replaced ☐ Waste gate valve adjusted ☐ Flame arrester checked ☐ Coolant changed ☐ Fuel filter replaced ....

Date: Status hours of operation: Company seal, signature	**Work carried out:** ☐ Engine oil and oil filter changed ☐ Sacrificial anode checked ☐ Valve play checked ☐ Spark plugs replaced ☐ Rubber mount replaced ☐ Waste gate valve adjusted ☐ Flame arrester checked ☐ Coolant changed ☐ Fuel filter replaced ....

Date: Status hours of operation: Company seal, signature	**Work carried out:** ☐ Engine oil and oil filter changed ☐ Sacrificial anode checked ☐ Valve play checked ☐ Spark plugs replaced ☐ Rubber mount replaced ☐ Waste gate valve adjusted ☐ Flame arrester checked ☐ Coolant changed ☐ Fuel filter replaced ....

	Work carried out:
Date:	☐ Engine oil and oil filter changed
	☐ Sacrificial anode checked
	☐ Valve play checked
	☐ Spark plugs replaced
Status	☐ Rubber mount replaced
hours of operation:	☐ Waste gate valve adjusted
	☐ Flame arrester checked
	☐ Coolant changed
	☐ Fuel filter replaced
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	.....
	.....
Company seal, signature	

	Work carried out:
Date:	☐ Engine oil and oil filter changed
	☐ Sacrificial anode checked
	☐ Valve play checked
	☐ Spark plugs replaced
Status	☐ Rubber mount replaced
hours of operation:	☐ Waste gate valve adjusted
	☐ Flame arrester checked
	☐ Coolant changed
	☐ Fuel filter replaced
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	.....
Company seal, signature	

	Work carried out:
Date:	☐ Engine oil and oil filter changed
	☐ Sacrificial anode checked
	☐ Valve play checked
	☐ Spark plugs replaced
Status	☐ Rubber mount replaced
hours of operation:	☐ Waste gate valve adjusted
	☐ Flame arrester checked
	☐ Coolant changed
	☐ Fuel filter replaced
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	.....
Company seal, signature	

	Work carried out:
Date:	☐ Engine oil and oil filter changed
	☐ Sacrificial anode checked
	☐ Valve play checked
	☐ Spark plugs replaced
Status	☐ Rubber mount replaced
hours of operation:	☐ Waste gate valve adjusted
	☐ Flame arrester checked
	☐ Coolant changed
	☐ Fuel filter replaced
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Company seal, signature	

	Work carried out:
Date:	☐ Engine oil and oil filter changed
	☐ Sacrificial anode checked
	☐ Valve play checked
	☐ Spark plugs replaced
Status	☐ Rubber mount replaced
hours of operation:	☐ Waste gate valve adjusted
	☐ Flame arrester checked
	☐ Coolant changed
	☐ Fuel filter replaced
	.....
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Company seal, signature	

	Work carried out:
Date:	☐ Engine oil and oil filter changed
	☐ Sacrificial anode checked
	☐ Valve play checked
	☐ Spark plugs replaced
Status	☐ Rubber mount replaced
hours of operation:	☐ Waste gate valve adjusted
	☐ Flame arrester checked
	☐ Coolant changed
	☐ Fuel filter replaced
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Company seal, signature	

Appendix

Engine manufacturer

Engine manufacturer	Weber Motor GmbH Zepernicker Chaussee 23-37 16321 Bernau bei Berlin Germany www.weber-motor.com

Exhaust type authorization and certification

This engine family complies with U.S. EPA Exhaust regulation for inboard/sterndrive marine engines as defined in 40 CFR 1045.

For further details see the „Emission Control Information“ label on engine expansion tank. (See chapter 3.2 Identification.)

USA EPA EMISSION LIMITED WARRANTY

Weber Motor Engine Family DWEBM.850DTG / DWEBM.850DTH

Model Year 2013

Weber Motor GmbH (Weber) warrants that the certified sterndrive/inboard (SD/I) engines are: (1) designed, built, and equipped to conform at the time of initial sale with the requirements of 40 CFR part 1045 and, (2) free from defects in materials and workmanship that may keep it from meeting these requirements. This emission limited warranty is in addition into vehicle manufacturer's standard limited warranty for inboard/ sterndrive (SD/I) applications.

The emission warranty period for these certified engines begins on the date the engines is first purchased and ends after a period of 48 month or 480 hours of engine use, whichever occurs first.

This emission related warranty covers components whose failure would increase an engine's emissions, including electronic controls, fuel injection, exhaust gas recirculation, aftertreatment, or any other system developed to control emissions. Replacing or repairing other components not covered by this emissions warranty or the standard warranty is the responsibility of the owner, including the parts and other costs associated with recommended maintenance.

The exclusive remedy for breach of this limited warranty shall be, at the exclusive option of Weber, repair or replacement of any defective materials, components or products. THE REMEDIES SET FORTH IN THIS LIMITED WARRANTY ARE THE ONLY REMEDIES AVAILABLE TO ANY PERSON FOR BREACH OF THIS WARRANTY. WEBER MOTOR GMBH SHALL HAVE NO LIABILITY TO ANY PERSON FOR INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY DESCRIPTION, WHETHER ARISING OUT OF EXPRESS OR IMPLIED WARRANTY OR ANY OTHER CONTRACT, NEGLIGENCE OR OTHER TORT OR OTHERWISE.

ALL IMLPIED WARRANTIES (INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) ARE LIMITED IN DURATION TO THE WARRANTY PERIOD DESCRIBED HEREIN. WEBER DISCLAIMS ALL EXPRESS WARRANTIES NOT STATED IN THIS WARRANTY. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply if it is inconsistent with controlling state law.

This limited warranty excludes failures not caused by a defect in material or workmanship. This limited warranty does not cover damage due to accidents, abuse or improper handling, maintenance or use. This limited warranty also does not cover any engine that has been structurally altered, or any engine that has been used in racing competition. This limited warranty also does not cover physical damage, corrosion or defects caused by fire, explosions or similar causes beyond the control of Weber.

If you have any questions regarding your warranty rights and responsibilities, you should contact the Vehicle Manufacturers Warranty Department.

Weber Motor GmbH, Zepernicker Chaussee 23-37, 16321 Bernau bei Berlin, Germany

Parts covered by emission warranty statement for Model Year 2013 Weber Motor personal watercraft engines:

- Spark Plug
- Ignition Coil
- Injector
- Intake Manifold
- Exhaust Manifold
- Turbocharger
- Fuel Rail
- Engine Control Unit
- Lambda Sensor
- Sensor Crank
- Sensor P/T
- Catalyst
- Catalyst Housing
- Catalyst End Cap
- Throttle

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